PB89-188783

Superfund Record of Decision (EPA Region 2): Marathon Battery, NY (Second Remedial Action), September 1988 (Re-Announced)

(U.S.) Environmental Protection Agency, Washington, DC

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U.S. Department of Commerce
National Technical Information Service
NTIS

United States
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Agency

Office of
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Superfund Record of Decision:

Marathon Battery, NY

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15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Marathon Battery Company (MBC) site, a former battery manufacturing plant, is located in the Village of Cold Spring in Putnam, New York, approximately 40 miles north of New York City. The area surrounding the site includes the Hudson River to the west, residential areas to the northwest, west, and southwest adjacent to the site, and wetlands including Foundry Cove, which is divided into East Foundry Cove (EFC) and West Foundry Cove, to the south. The site operated from 1952 to 1979 producing military and commercial batteries. During this time the site changed ownership several times, finally operating as the MBC from 1969 to 1979. Before 1965, the plant's wastewater treatment system discharged into the Hudson River at the Cold Spring pier via the Cold Spring sewer system, except during periods of overload or system shutdown during which time the process effluent was discharged directly into East Foundry Cove Marsh (EFCM) to the southeast. In 1965, however, the plant began discharging all of the process effluent into EFCM after the New York State Department of Health concluded that the industrial discharge could not be managed by a new sewage treatment system proposed for the Village of Cold Spring. Between November 1972 and July 1973, a limited cleanup was conducted by MBC and other responsible parties, to remove sediment from parts of Foundry Cove and surrounding areas contaminated with cadmium and nickel in excess of 900 mg/kg. (See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision
Marathon Battery, NY
Second Remedial Action
Contaminated Media: gw, sediments, soil
Key Contaminants: metals, VOCs (PCE, TCE)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

Availability Statement	19. Security Class (This Report) None	21. No. of Pages 231
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) See Instructions on Reverse OPTIONAL FORM 272 (4-77)
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Department of Commerce

EPA/ROD/R02-88/064
arathon Battery, NY
Second Remedial Action

16. ABSTRACT (continued)

Approximately 5,000 yd^3 of cadmium-contaminated sediments were dredged and subsequently placed in a clay-lined underground vault on the plant property. However, studies conducted in Foundry Cove between 1976 to 1980 continued to detect cadmium and nickel concentrations in excess of 900 mg/kg. To expedite remediation, the site has been divided into three separate geographic areas as follows: Area I, EFCM and Constitution Marsh southeast of the plant; Area II, the 11-acre former battery plant grounds, including the former battery manufacturing facility (presently used as a book repository), a production well, a 500,000 gallon water tower, building debris, a dredge spoils vault, a parking lot, and nearby residential yards; and Area III, EFC and the portion of the Hudson River in the vicinity of the wastewater discharge pipe on Cold Spring pier. A ROD was signed for Area I in September 1986 with cleanup activities to include dredging the EFCM and replacing the sediments with clay and clean fill. This ROD addresses Area II including localized soil contamination primarily in the area around the building, under debris, and around the parking lot; dust inside the building; and the sludge spoils vault. A subsequent ROD will address Area III. The primary contaminants of concern affecting the ground water, soil, debris, and inside surfaces of a building in Area II are: VOCs including PCE and TCE, and metals including cadmium and nickel.

The selected remedial action for Area II at this site includes: decontamination of the inside surfaces and contents of the former battery facility to remove the heavy metal-contaminated dust; excavation of both the cadmium-contaminated soil on the battery plant grounds and nearby residential yards, and the dredge spoils vault, followed by onsite fixation of the excavated soil, dust, and vault sediments and offsite disposal; excavation of the VOC-contaminated soil hotspots followed by enhanced volatilization and replacement of the clean residuals onsite; backfilling of the excavation areas with clean fill; institutional controls; ground water monitoring; and evaluation and performance of minor repairs, if needed, to the inoperable sprinkler and heating systems inside the former battery facility. The estimated present worth cost for this remedial action is $10,010,000, with annual O&M of $775,000 (year 1) and $17,000 (years 2-30).

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Marathon Battery Company, Cold Spring, Putnam County, New York.

STATEMENT OF PURPOSE AND BASIS

This decision document presents the selected remedial action for Area II of the Marathon Battery Company site (Site). The selected remedial alternative was developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), 42 U.S.C. §9601 et seq., and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, November 20, 1985.

The attached index identifies the documents that comprise the Administrative Record for Area II. The documents in the attached Responsiveness Summary and the Administrative Record are the basis for the selected remedial action.

DESCRIPTION OF THE SELECTED REMEDY

The major components of the selected remedy can be summarized as follows:

- Decontamination of the inside surfaces and contents of the former battery facility to remove the heavy metal-contaminated dust.

- Excavation of the cadmium-contaminated soil to a level of 20 mg/kg on the battery plant grounds and the residential yards impacted by the Site.

- Excavation of the on-site dredge spoils vault.

- Fixation of the excavated soil, dust, and vault sediments.

- Off-site disposal of the cadmium-contaminated soils, sediments, and dust at a facility to be arranged for by NYSDEC.

- Excavation of the volatile organic-contaminated soil hotspots followed by enhanced volatilization and replacement of the clean residuals on-site.

- Backfilling of the excavated areas with clean fill.

- Institutional controls to restrict development of the aquifer for potable or municipal use, until State or Federal applicable or relevant and appropriate requirements are reached.

- Long-term monitoring of the groundwater underlying the Site.

- Evaluation and performance of minor repairs, if needed, to the inoperable sprinkler and heating systems inside the former battery facility.

DECLARATION

Consistent with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986, and the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300, I have determined that the selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and is cost-effective. Furthermore, this remedy satisfies the preference for treatment that reduces mobility, toxicity, or volume as a principal element. Finally, I have determined that this remedy utilizes permanent solutions and alternate treatment technologies to the maximum extent practicable.

Because this remedy will not result in hazardous substances remaining on-site above health-based levels, the five year review will not apply after completion of the remedial action.

The State of New York is in agreement with the selected alternatives but does not concur on the cadmium cleanup level recommended by the Environmental Protection Agency (EPA). EPA employed the cleanup level of 20 mg/kg recommended by the Agency for Toxic Substances and Disease Registry (ATSDR). Based on the recommendations of ATSDR, EPA believes that the 20 mg/kg level is fully protective for both residential and industrial areas. However, New York State believes that 20 mg/kg is unacceptable and is developing lower cleanup criteria yet to be formally provided to EPA. In recognition of these concerns, EPA will review future documentation from the State, and reconsider the recommended cadmium cleanup level in residential areas.

William J

William J. Muszynski, P.E.
Acting Regional Administrator

9-30-88
Date

ROD DECISION SUMMARY

MARATHON BATTERY COMPANY SITE - AREA II

COLD SPRING, PUTNAM COUNTY, NEW YORK

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION II

NEW YORK

Record of Decision
Marathon Battery Company Site
New York

SITE LOCATION AND DESCRIPTION

Site Location

The Marathon Battery Company site (Site) is situated in the Village of Cold Spring in Putnam County, New York. It is across the Hudson River and slightly north of the United States Military Academy at West Point, and approximately 40 miles north of New York City. The Site is located within the incorporated boundaries of Philipstown (Figure 1).

Site Description

The Site is comprised of three study areas: Area I, which consists of East Foundry Cove Marsh and Constitution Marsh; Area II, which encompasses the former battery plant, presently serving as a book repository, the surrounding grounds, and a vault with cadmium-contaminated sediments dredged from East Foundry Cove in the 1970s; and Area III, which includes East Foundry Cove, and the Hudson River in the vicinity of the Cold Spring pier (Figure 2).

This Record of Decision (ROD) addresses the Area II portion of the Site.

The former battery plant grounds are approximately 11 acres in size, and are generally flat to slightly rolling. The most prominent features of the property are the former battery manufacturing facility of approximately 114,000 square feet, a Butler building of approximately 2,500 square feet, a production well, and a 500,000 gallon water tower. In addition, the property is littered with building debris from renovations of the main building, and with wooden pallets from the operation of the book repository. Approximately 30% to 40% of the interior space of the former battery plant is occupied with books inside and outside of packing boxes. Some of these books are wrapped in shrinkwrap plastic and appear to be relatively clean while others are heavily coated with dust.

The dredge spoils vault is fenced and encompasses 15,000 square feet with the cap being 3 to 4 feet below grade. The surface of the vault is covered with dense vegetation and several trees approximately 15 to 20 feet in height. The vault contains approximately 5,000 cubic yards of sediment with concentrations ranging from 1000 mg/kg to 3000 mg/kg.

Houses along Constitution Drive directly behind the former battery plant are located approximately 15 feet above the northern portion of the former battery plant grounds.

Ground surface elevations on-site range from a low of 27 feet above mean sea level in the northwest portion of the Site to a height of 45 feet above mean sea level in the southwest portion of the Site. There is approximately a 20 foot drop in elevation in the southeast fence line of the Site, trending south towards East Foundry Cove. Such a surface topography is common to areas of glacial deposits.

The overall groundwater flow at the Site is to the southeast, towards East Foundry Cove. In the west corner of the Site where the bedrock is situated 2.5 feet below the ground surface, groundwater is non-existent. Based on the hydraulic parameters generated, it is concluded that the aquifer under the Site is highly transmissive. The aquifer is not presently used as source of drinking water; the area residents receive their water from municipal water supplies.

Site History and Enforcement Activities

The source of contaminants found throughout Area II is the former nickel-cadmium battery manufacturing plant located on Kemble Avenue in the Village of Cold Spring (Figure 3).

The facility was designed and constructed in 1952 by the U.S. Army Corps of Engineers (USACE) for the U.S. Army Signal Corps. Initial operation of the facilty was contracted by the Signal Corps to Sonotone Corporation (Sonotone). The first batteries manufactured were used in the NIKE Missile Program. In 1957, the facility began production of aircraft batteries for military jet fighters.

In September 1962, Sonotone Corporation purchased the plant and its equipment from the United States. In 1963, thirty-five thousand square feet of production area were added and production of nickel-cadmium batteries for commercial customers was initiated.

In December 1967, Sonotone became a wholly-owned subsidiary of Clevite, Incorporated (Clevite) which operated the facility for slightly over 18 months. In July 1969, Clevite merged with Gould, Incorporated (Gould); however, Gould was required to divest itself of the plant due to its ownership of other battery facilities. As a result, the plant appears to have been operated by Gould for only one week.

In July 1969, the plant was sold to Business Funds, Incorporated, which subsequently changed its name to Marathon Battery Company. Production increased to near capacity, and expansion of the assembly operations was undertaken in the company's plant in Waco, Texas. Eventually, all operations were transferred to the Texas plant. The last manufacturing operations performed in the Village of Cold Spring were during March 1979.

The facility, with the equipment removed, was purchased in November 1980 by Merchandise Dynamics, Incorporated (Merchandise Dynamics) for use as a book storage and distribution facility. Merchandise Dynamics has filed for Chapter 7 bankruptcy.

On September 22, 1970, a complaint was filed (70 Civ. 4110) in the U.S. District Court, Southern District of New York, by the United States against Marathon Battery Company et al for violation of Sections 407, 413, and 441 of Title 33 of the United States Code (Refuse Act). The complaint sought preliminary and permanent injunctive relief, enjoining and restraining the "discharge or deposit of any alkali, or any salt of nickel, cadmium or cobalt...directly or indirectly into Foundry Cove or the Hudson River" and ordered Marathon Battery Company and the other defendants to remove the "deposited salts, and any other refuse or debris deposited in Foundry Cove."

A Final Judgment was filed in 1972, which required Marathon Battery Company, Sonotone, Clevite, and Gould to remove contaminated sediments to a concentration of 900 milligrams per kilogram (mg/kg) from the outfall area adjacent to the discharge pipe, the channel leading to the main body of Foundry Cove, and a portion of Foundry Cove. Marathon Battery Company, Sonotone, Clevite, and Gould, participated in the limited cleanup of Foundry Cove.

In response to a report filed with the Court on the dredging by the defendants, the United States filed a Satisfaction of Judgment, stating that "the defendants...are deemed to have complied with the terms of the Final Judgment, as amended, with respect to the removal of the deposits of cadmium from Foundry Cove and are relieved from any further obligation with respect thereto."

The Army was not named as a co-defendant in the United States' suit. Marathon Battery Company, Sonotone, Clevite, and Gould alleged that the Army had participated in damaging Foundry Cove by engineering and approving the plant design and by consructing the plant.

Between November 1972 and July 1973, dredging was conducted. The dredged sediments were mixed with 0.5% limestone and were buried in an asphalt and clay-lined underground vault on the plant property. A fence was placed around the vault. The surface of the vault was to be maintained in perpetuity by the property owner and monitoring was to be conducted by the New York State Department of Environmental Conservation (NYSDEC).

Studies conducted from 1976 to 1980 by NYSDEC, the United States Environmental Protection Agency (EPA), and New York University indicated, however, the East Foundry Cove was still contaminated, much of it at concentrations greater than 900 mg/kg.

In 1981, this area was designated as a Superfund site. Subsequently, in September 1983, it was designated a state-lead Superfund site upon signing of a cooperative agreement between NYSDEC and EPA.

In 1983, in response to an informal complaint regarding possible employee illnesses associated with cadmium exposure, the Occupational Safety and Health Administration (OSHA) took air samples during routine and maintenance work in the warehouse. These data showed exposure levels of cadmium, lead, and nickel to be below OSHA's permissible exposure limits. Based upon these sample results, OSHA concluded that, although there was evidence of heavy metal-contaminated dust in the facility, the only potential exposure was to workers involved in maintenance operations. OSHA advised that these employees should wear respiratory equipment while performing dust-producing activities.

In 1984, in order to investigate the feasibility of remediating the Site, NYSDEC contracted with Acres International Corporation (Acres) of Buffalo, New York, to perform a Remedial Investigation/Feasibility Study (RI/FS). Area II sampling efforts in the summer of 1985 identified contamination in the dust inside the building at concentrations as high as 120,000 mg/kg and 130,000 mg/kg, respectively.

In August 1985, a draft RI/FS report was prepared by Acres. Because the FS contained insufficient information to evaluate effectively the effects of remedial alternatives under consideration, the USACE was tasked to expand upon the study by further evaluating the technically feasible means of remediating Foundry Cove and Constitution Marsh. The USACE completed this technical assistance in February 1986.

In March 1986, following a contractual dispute with its contractor, NYSDEC requested that EPA assume the lead responsibility for the project.

In April 1986, Ebasco Services, Incorporated (Ebasco) initiated a supplemental RI for Area I. In September 1986, a ROD was signed by EPA, calling for the remediation of East Foundry Cove Marsh and "no action" for Constitution Marsh.

An analysis of the sampling data from the former battery facility by the Agency for Toxic Substances and Disease Registry (ATSDR) in late June 1986 led to the recommendation that the facility be closed immediately to all personnel not in personal protective equipment, until the cadmium levels were below occupational standards and guidelines. On July 3, 1986, EPA advised OSHA of the levels of cadmium detected in the warehouse, referring the project for immediate action.

Because of the proximity of the local residences to the former battery facility, on July 9-10, 1986, the EPA Technical Assistance Team (TAT) collected twenty-two discrete soil surface samples from the yards of residences on Constitution Avenue and the Boulevard (Figure 4). TAT inspected the warehouse and took soil and air samples around the perimeter of the facility. Results from this investigation showed no detectable levels of cadmium in the air, and concentrations ranging to 600 mg/kg in the soil on the plant grounds.

In July 1986, OSHA performed an investigation of the warehouse. Air and wipe samples were collected. Results from the air sampling showed levels of cadmium in the employees' breathing zone to be below OSHA's occupational exposure criteria.

In February 1988, EPA conducted an investigation of the sprinkler system within the battery facility in response to notification by the Cold Spring fire department that the system was inoperable. EPA, concerned that a fire could result in a release of contaminated dust into the environment, inspected the facility and verified that the sprinkler system was inoperable.

EPA intends to proceed under CERCLA against the Potentially Responsible Parties (PRPs). Consequently, notice letters were sent to USACE, Marathon Battery Company, Gould, Sonotone, and Clevite, as well as Merchandise Dynamics, the current property owner.

Marathon Battery Company, Gould, and the USACE have cooperated in supplying information and meeting with the Agency to comment on the proposed remedial alternative.

COMMUNITY RELATIONS HISTORY

The governmental effort to ensure significant community involvement in Cold Spring has been extensive. A comprehensive public relations strategy was developed by EPA to keep concerned parties cognizant of CERCLA activities at the Site. The EPA has a public information repository in Cold Spring. The public is also kept informed through public meetings.

A public meeting was held on June 13, 1988 to discuss the preferred alternative for the Area II portion of the Site. A more detailed discussion of the outcome of this public meeting can be found in the Responsiveness Summary.

The Supplemental RI/FS and the Proposed Remedial Action Plan (PRAP) were released for public comment on May 27, 1988. After submittal of the PRAP to the public, a number of issues of concern were raised by NYSDEC and the public. In particular, EPA reassessed the No-Action alternative for the vault and the proposed cleanup level of 50 mg/kg for the on-site cadmium-contaminated soil.

The Responsiveness Summary addresses questions and concerns raised by interested parties during the public comment period.

SCOPE AND ROLE OF OPERABLE UNIT

As indicated previously, the Site has been divided into three areas, addressed as separate operable units. A ROD for the Area I portion was signed in September 1986, and the design is currently underway. This ROD deals with the second operable unit which encompasses the former battery plant, the dredge spoils vault, the surrounding grounds, and nearby residential yards.

SUMMARY OF SITE CHARACTERISTICS

The RI/FS was prepared by EPA's contractor, Ebasco in April 1988. Five different media were sampled during the RI: surface soils; subsurface soils; groundwater; and dust and concrete borings from the former battery plant. All media were found to be contaminated by the activities performed at the plant.

Soil Investigation

Sixty-six surface and subsurface soil samples were collected from the former battery plant grounds and analyzed for full hazardous substance list (HSL) compound concentrations. On-site soils were found to be contaminated with heavy metals, volatile organic compounds, base/neutral extractable compounds, and pesticides. Tables 1 and 2 list the concentrations of inorganic and organic compounds detected in soils Figure 5 shows the locations of the contaminated soil on the plant grounds. Table 3 summarizes average United States soil concentrations found at this site. All compounds that were found to exceed background level and criteria are noted.

Cadmium concentrations ranged from 0-34,700 mg/kg, with a mean of 685 mg/kg. Nickel was found in concentrations of 0-36,300 mg/kg, with a mean of 674 mg/kg, and cobalt was found at 0-1800 mg/kg, with a mean of 35.2 mg/kg*. In general, the concentration distribution patterns of these three metals are very similar. Levels of metal contamination decrease with distance from the former battery plant and with depth from ground surface. Metal contamination is limited to the upper 60-90 cm (2-3 feet) of site soils. The sources of this contamination are believed to be air emissions from former ventilation units and contaminated debris which was removed from the building and still litters the Site.

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* Soil metal concentrations reported in the RI include samples taken previous to the RI by NYSDEC's, contractor Acres. This

In summary, heavy metal-contaminated soils on the former battery plant grounds occur primarily in the area around the building or under debris from the demolition. Since no contaminant-specific promulgated applicable or relevant and appropriate federal and state requirements (ARARS) exist for heavy metals, other criteria were evaluated to determine the level of cleanup of contamination at the Site.

Hazard substance list (HSL) compounds were found in both surface and subsurface soils on the former battery plant grounds. The majority of compounds found were polycyclic aromatic hydrocarbons (PAHs) ranging in concentration from 0 to 9.2 mg/kg. Soil contamination by PAHs appears to be related to surface runoff from the asphalt parking lot.

Volatile organic compounds were also detected in the soil on the former battery plant grounds. Trichloroethylene was found at one location, 12-14 feet below ground level, at concentrations of 13 to 30 ug/kg. Trichloroethylene was detected at another location at 37 ug/kg, 35 to 37 feet below ground level in the saturated soil. Tetrachloroethylene was detected in soils at three locations, 12 to 14 feet below the ground surface, at a concentration of 15 ug/kg and in the surface (0-6") at 2.3 and 2.2 ug/kg. Other volatile organic compounds detected include toluene at 21,000 ug/kg, xylene at 410 ug/kg, ethylbenzene at 150 ug/kg and chloroform at 120 ug/kg.

Several pesticide and pesticide breakdown products were found in the soil samples. Chlordane was found in surface soil (0-6") at 8,900 ug/kg. 4,4'-DDT was found at concentrations of 6.4, 3.2, and 24 ug/kg, while its breakdown product DDE and Dieldrin were found at concentrations of 10 ug/kg and 3.1 ug/kg, respectively. Beta BHC was detected at 260 ug/kg, endosulfan sulfate was detected at a concentration of 12 ug/kg, and heptachlor epoxide was detected at 6.9 ug/kg.

In general, soil contamination is localized in areas near the former battery plant building and the parking lot.

Groundwater Contamination

During the RI, 17 groundwater samples were collected for HSL volatile organic contaminant analysis (Table 4). Nine of the groundwater samples indicated TCE contamination with concentrations ranging from 2 ug/1 to 100 ug/1. The most upgradient well had the highest TCE concentrations, ranging from 82 to 100 ug/1. 1,1-trichloroethane in this well ranges from 8 to 18 ug/1. The most downgradient well had a TCE concentration of 26 ug/1 and 1,1,1-trichloroethane at 5.5 ug/1. Wells located approximately at the mid-point between the upgradient and downgradient wells have TCE concentrations of 6, 8 and 65 ug/1, and 1,1,1-trichloroethane concentrations of 2, 0 and 9 ug/1. These five monitoring wells are situated in a line with groundwater flow direction (i.e., southeast; see site description). This may indicate a volatile organic contaminant plume present in the groundwater, with the contaminant source near the upgradient well. This assumption is supported by the TCE- and tetrachloroethane-contaminated soil samples collected at this monitoring well location. 1,2-dichloroethane was detected at concentrations of 15 ug/1 during the pump test. 1,2-dichloroethane was not detected in groundwater samples collected from the other monitoring wells.

Building Contamination

During the RI, representative dust samples were taken from 19 locations of the building surfaces (i.e., walls, ceilings, floors, etc.) and from six locations on the stacked book surfaces (i.e., plastic covers, boxes, etc.) (Table 5).

Dust samples were analyzed for cadmium, cobalt and nickel. The concentrations of these metals in building dust are shown in Table 5. Cadmium concentrations in building dust ranged from 24-15,300 mg/kg with a mean of 5946 mg/kg. Cobalt concentrations ranged from 1.2-462 mg/kg, with a mean of 33.26 mg/kg, while nickel dust concentrations ranged from 36 to 21,500 mg/kg, with a mean of 6771 mg/kg*.

The estimated surface areas of the building and the stacked books are 239,000 ft^2 and 322,000 ft^2 respectively. Assuming that the thickness of the dust on the surfaces is 1/16 inch, the total dust volume from both the building surfaces and the stacked books surfaces is 110 yd^3.

Cadmium, cobalt and nickel analyses were performed on concrete borings. In seven samples, no cadmium was found in the concrete; cobalt concentrations ranged from 7.1 to 66 mg/kg, and nickel concentrations ranged from 20 to 200 mg/kg.

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* Building dust metal conentrations reported in the RI include samples taken previous to the RI by NYSDEC's contractor ACRES.

Integrity of the Spoils Vault

Approximately 5000 cubic yards of sediment were deposited in an underground vault located on the former battery plant grounds in 1972 (Figure 3). These sediments have a cadmium concentration ranging from 1000 mg/kg to 3000 mg/kg. Five monitoring wells were installed around the perimeter of the dredge spoils vault, and subsurface soils and groundwater were analyzed to determine whether the cadmium, cobalt and nickel contaminated sediments had leaked from the vault. The results of these analyses showed that contaminated sediments have not migrated from the vault (Table 4). None of the groundwater samples or subsurface soils collected from the vault wells produced any cadmium, cobalt, or nickel.

SUMMARY OF SITE RISKS

The following evaluation is consistent with EPA Superfund Public Health Evaluation Manual, dated October 1986.

The chemical parameters presented in Tables 1 and 2 which were found to exceed health and environmentally based values were candidate indicator parameters. Several compounds were eliminated based on low concentrations present in soil, limited available toxicity data for health risk assessment, or low potential for exposure.

Many base/neutral polycyclic aromatic hydrcarbons (PAHs) were detected in the surface soils of the former battery plant grounds. These PAHs were detected in 28 of the 66 soil samples collected during the investigation. The PAHs which were detected during the sampling effort are generally mid to high molecular weight PAHs, indicative of asphalt or coal tar. Benzo (a) Pyrene (B(a)P) was detected in 12 of 66 total soil samples, ranging from 0.096 to 6.5 mg/kg. These B(a)P concentrations fall within normal background concentrations. Based on previous studies, it has been shown that asphalt can contain between 1.0 and 69 mg/kg of total B(a)P, some of which can be transported to soils near roadways and parking lots. It appears that the levels of B(a)P and other PAHs found in the soils of the Marathon Battery Company site are indicative of normal background contamination not requiring remediation.

The pesticides detected in the soil samples included chlordane and breakdown products of 4-4' DDT, lindane and heptachlor. These pesticides and their breakdown products were detected in 11 of the 66 collected soil samples and generally ranged between 1.6 and 260 ug/kg, with chlordane being found in one sample at 8900 ug/kg near the fence lines. Since chlordane was only found in one soil sample, it is believed that it represents a localized spill unrelated to site operations and should not be considered site-specific contamination requiring remediation. In general, none of the pesticides detected in the soil samples were considered to be site-specific contamination requiring remediation and were not addressed in the public health evaluation.

The final indicator chemicals which were subjected to the health risk assessment are cadmium, nickel, chloroform, tricloroethylene, tetrachloroethylene, 1,1,1-trichloroethane, and 1,2-dichloroethane.

Based on environmental features and surroundings, along with possible activities and concerns of nearby residents, the following exposure pathways were initially considered to be of potential significance:

- o Ingestion of soil/dust
- o Ingestion of groundwater
- o Direct contact with soil/building dust
- o Inhalation of soil/building dust
- o Inhalation of fumes during a fire event
- o Volatilization of organics from groundwater during use
- o Contamination of groundwater by dredge spoils vault

Numerical estimates of risk were calculated for the seven indicator chemicals for each potential route of exposure, on the basis of Acceptable Chronic Intake values and Cancer Potency Factors (CPFs) and the human intakes estimated for each exposure scenario. Inhalation (USEPA, 1986) of cadmium-contaminated dust (soils) was identified as the pathway of greatest risk to nearby residents and persons entering the property. The inhalation model assumed that dusts were generated from the most highly contaminated soils on-site, that 60% of inhaled cadmium was absorbed into the lung, and that adults were exposed to an ambient dust level typical of rural air. The model utilized the EPA Cancer Potency Factor for cadmium of 6.1 mg/kg/d (Ebasco).

Using these assumptions, it was determined that inhalation of cadmium exceeded the 10^{-6} cancer risk level by factors of 98.0 and 271 for soils and former plant dusts, respectively. Ebasco determined that soil cadmium levels would have to be reduced to 56 ppm in order to achieve the 10^{-6} cancer risk level.

Although the groundwater is not currently used for drinking water or any other potable water use, the Village of Cold Spring has expressed interest in using this aquifer to supplement its fire hydrant supply. This fire hydrant water supply is connected to the municipal water supply, based on design drawings from the construction phase of the former battery plant. Therefore the potential exists, if the aquifer is used as a water source, residents may be exposed to contaminants.

It was assumed in the model that a person drinking water from the aquifer consumed 2 liters per day for a lifetime, with contaminant concentrations at the maximum level determined in the RI. This evaluation indicated that trichloroethylene, chloroform, tetrachloroethylene, 1,1,1-trichloroethane and 1,2 dichloroethane exceeded the 10^{-6} cancer risk by factors of 31.4, 254, 3.5, 3.9, and 3.7, respectively.

The risk assessment also indicated that by the direct soil/dust ingestion scenario, cadmium exceeded the maximum acceptable intake level by a factor of 18 for workers ingesting site soils, and by a factor of 48 for workers ingesting building dusts.

The Ebasco risk assessment determined that the cadmium-contaminated dust would not pose a significant health risk to firefighters or nearby residents in the event of a fire at the former battery plant.

The EPA subsequently requested that the Agency for Toxic Substances and Disease Registry (ATSDR) evaluate the health risk associated with ingestion of garden vegetables grown on cadmium-contaminated soils. ATSDR assumed that the dietary intake of high-and-low cadmium accumulating vegetables is, as reported in the FDA 1981-82 total diet study (Gartrell, 1986)' that 50% of vegetables consumed are home-grown, and that accumulation of cadmium by vegetable classes is as reported in the literature (Davis, 1984, and Smilde, 1982). The maximum daily dietary intake of cadmium recommended by EPA is 70 ug/d. Using the above assumptions, ATSDR estimated that ingestion of vegetables grown in garden soils containing 20 mg/kg cadmium would produce a daily dietary cadmium intake of 41-53 ug/d, and ATSDR recommended a cadmium cleanup level for residential soils of 20 mg/kg.

Dermal absorption of on-site soil and dust was found to be an ineffective pathway since no compound exceeded the 10^{-6} cancer risk or acceptable intake rates. A cancer risk less than 10^{-6} was found for ingestion of groundwater, and also inhalation of fumes during a fire event.

Using the acceptable cadmium intake rate of 2.9×10^{-4} mg/kg/day, acceptable site specific soil and dust concentrations for the ingestion pathway are 3140 mg/kg. Based on a carcinogenic risk of 10^{-6} and compound-specific acceptable intakes, acceptable soil and dust concentrations for cadmium for the inhalation pathway are 56.3 mg/kg.

The model used for the ingestion of groundwater indicates that a significant risk would occur if groundwater were to be used as a drinking water supply.

Acceptable water concentrations calculated in the RI report are: trichloroethylene, 3 ug/1; chloroform, 0 ug/1; tetrachcloroethlene, 0 ug/1; 1,1,1-trichloroethane, 0 ug/1 and 1,2-dichloroethane, 0 ug/1. It is anticipated that the groundwater will take 3-10 years to reach these acceptable levels by means of natural attenuation.

A complete description of the analytical methods that were used in making these risk calculations are documented in the RI report and supplementary memorandum which are part of the Administrative Record.

DOCUMENTATION OF SIGNIFICANT CHANGES

Based on the requirements of CERCLA Section 117(b), EPA has determined that significant changes have been made to the selected remedy from the time it was proposed in the PRAP until final adoption of the remedy in the ROD.

Based upon further consideration of public comments and review of information regarding the design specification of the vault, it is EPA's judgment that Alternative V-3, which involves excavation of the sediments within the vault, followed by chemical fixation and off-site disposal, would provide a better balance of permanence than the "no-action" alternative. Although the technical data collected in the vicinity of the vault does not indicate that the integrity of the vault has been breached, the levels of uncertainty associated with the useful life of the vault lead EPA to conclude that Alternative V-3 would provide a higher degree of protection to human health and the environment. In addition, the proposed excavation of the vault would result in cost savings (by avoiding remobilization activities) if EPA has to excavate the vault at a future date.

In addition, the PRAP called for excavation of the cadmium-contaminated soils on the plant grounds to a level of 50 mg/kg. Since excavating the cadmium-contaminated soil on the plant grounds to a level of 50 mg/kg could potentially allow the migration of cadmium-contaminated soils to the adjacent residential yards (which will be remediated to 20 mg/kg), and since the incremental cost associated with remediating the plant ground soils to 20 mg/kg (approximately $500,000) is insignificant compared to the overall cost of the remedy for the Site, a remediation level of 20 mg/kg of cadmium for both the plant grounds and adjacent residential yards is recommended.

Also, the PRAP called for the repair of the damaged sprinkler system and heating sytem within the former battery facility to reduce the potential for release of cadmium-contaminated dust to the environment should a fire occur before decontamination is complete. As an alternative approach, decontamination of the interior building will be accelerated. The existing fire protection system will be evaluated and minor repairs will be made to render the system operational. The collected contaminated dust will be placed in secure containers pending final disposition.

DESCRIPTION OF ALTERNATIVES

Table 6 summarizes all remedial action technologies that were considered for remediation of Area II of the Site. This table presents the status of each technology with regard to further consideration during development of preliminary alternatives and brief explanations describing why technologies were eliminated. The technologies that were considered were then combined into preliminary remedial action alternatives. As a result of the initial screening process, a total of three ground-water, four dust/soil, and four dredge spoils vault remedies were developed for detailed comparative evaluation.

GROUNDWATER

Alternative GW-1: No Action (Natural Attenuation)

The "no-action" alternative for the groundwater underlying the former battery plant grounds consists of a long-term monitoring program. Sampling of the six existing monitoring wells on-site, and of additional wells which will be installed into the bedrock, monitoring will continue until health based levels are reached by natural attenuation. The information gathered will be used to determine whether the concentrations of the contaminants of concern (i.e., trichloroethylene, tetrachloroethylene, 1,1,1-trichloroethane, 1,2-dichloroethane and chloroform) have been lowered to acceptable levels). Institional controls would restrict development of the aquifer for potable and municipal water uses until State and Federal ARARs are reached. Because of the hydrology of the aquifer (highly transmissive), ARARs are expected to be achieved within three to ten years after removal of the volatile organic-contaminated soil.

Alternative GW-3: Pumping/Carbon Absorption/On-Site Discharge

This alternative consists of a pumping system involving four pumping wells to remove the volatile organic-contaminated groundwater. The contaminated groundwater would be pumped to a carbon adsorption system which would consist of two downflow fixed carbon beds in series. Organic contaminants would be removed to levels equal to or below the State and Federal ARARs specified for all drinking water supplies. The treated water would be discharged to East Foundry Cove at a location which would prevent resuspension or transport of sediments in the Cove.

Alternative GW-4: Pumping/Hydrogen Peroxide-Ultraviolet Oxidation/On-Site

This alternative consists of a pumping system involving four pumping wells to remove the volatile organic-contaminated groundwater. The contaminated groundwater would be treated by chemical oxidation with hydrogen peroxide (H_2O_2) and ultraviolet light. A schematic diagram of this system is shown in Figure 6. Groundwater is first mixed with a 50% H_2O_2 solution. It then enters an oxidation chamber where the H_2O_2 would be readily converted to hydroxyl radicals through the influence of UV light. High intensity UV light and the concentrated hydroxyl radicals synergistically promote rapid breakdown of organic molecules. Reduction of the volatile organics to levels equal to or below State and Federal ARARs for public drinking water supplies would be achieved.

CONTAMINATED SOIL AND BUILDING DUST

Alternative S-1: No Action

The "no-action" alternative for the cadmium-contaminated soil and the dust in the former battery plant consists of a long-term monitoring and an institutional control program. Institutional control would restrict public access to the plant grounds. Currently, there is an eight foot chain link security fence with 3-strand barbed wire enclosing the entire area. The total length of the fence is approximately 1,049 m (3,440 ft). As added protection, warning signs would be posted at the points of entry and at prominent locations on the fence every 60 m (200 ft).

A long-term monitoring program would be implemented in order to assess the migration of contaminants. Monitoring would include sampling and testing the groundwater and soil runoff every six months for 30 years. The groundwater sampling would be done using the existing monitoring wells. The monitoring program would also include an annual inspection of the facility to verify the condition of the fence, warning signs and the building.

Alternative S-2: Building Decontamination/Off-Site Disposal of Dust/Soil Capping

Decontamination procedures would be used to remove the heavy metal-contaminated dust on the inside surfaces of the building (e.g., walls, ceilings, floors, etc.) and on the surfaces of the stacked books. The collected dust (approximately 100 yd^3) would then be transported by truck to an off-site disposal facility. Soil from the plant grounds and nearby residential yards contaminated with cadmium at a concentration greater than 20 mg/kg would be compacted, graded and capped with macadam. The estimated total area needed to be capped is 53,300 ft^2.

Capping the cadmium-contaminated areas would also cap the volatile organic-contaminated soil.

A long-term monitoring and maintenance program would be implemented to monitor groundwater quality and to ensure the integrity of the cap.

Alternative S-3: Building Decontamination/Soil Excavation/Fixation/Enhanced Volatilization/On-Site Disposal

In this remedial alternative, the building decontamination would be carried out in the same manner as that of Alternative S-2. However, the collected dust would be treated along with the metal-contaminated soil.

Approximately 5,500 yd^3 of metal-contaminated soil and 600 yd^3 of volatile organic-contaminated soil would be excavated.

The excavated metal-contaminated soil from nearby residential yards and the battery plant grounds and the dust from within the building would be transported to an on-site treatment facility. In the treatment unit, the contaminated soil and dust would be mixed with fixating materials (e.g., sodium silicates, Portland cement and/or other proprietary chemicals) and water, and allowed to cure for over 48 hours. After curing, the metal contaminants would be bound and/or physically encapsulated into the product material. Therefore, the contaminants in the original soil and dust would no longer leach out. The fixated material would not be hazardous as defined by RCRA and would be disposed of on-site in a pit located in the southwest section of the former battery plant grounds.

Because fixation would result in a volume increase, it is anticipated that the ground surface would either have to be regraded in a different configuration from what currently exists, or the fixated material would occupy a larger area of the Site.

The areas where volatile organics were detected contain heavy metal-contamination below the cadmium level of 20 mg/kg. The soil found in these areas would be excavated and subjected to the enhanced volatilization process, and then redeposited on-site.

Alternative S-4: Building Decontamination/Soil Excavation/ Fixation/Enhanced Volatilization/Off-Site Disposal

In this remedial alternative, approximately 110 yd^3 of dust would be removed from the inside surfaces of the building and from the surfaces of the stacked books. Approximately 5,500 yd^3 of cadmium-contaminated soil and 600 yd^3 of volatile organic-contaminated soil would be excavated.

The excavated cadmium-contaminated soil from nearby residential yards and the battery grounds and the dust from within the building would be transported to an on-site treatment facility. In the treatment unit, the contaminated soil and dust would be mixed with fixating materials (e.g., sodium silicates, Portland cement and/or other proprietary chemicals) and water, and allowed to cure for over 48 hours. After curing, the metal contaminants would be bound and/or physically encapsulated into the product material. The fixated material would not be hazardous as defined by RCRA, and would be disposed of in an off-site disposal facility. Clean fill would be brought in to restore the property to its orginial contour.

The areas where volatile organics were detected contain metal contaminants below the cadmium cleanup level of 20 mg/kg. The soil found in these areas would be excavated and subjected to the enhanced volatilization process, and then redeposited on-site.

SEDIMENTS IN THE VAULT

Alternative V-1: No Action

The "no-action" alternative for the sediments in the vault at the former battery plant site consists of a long-term monitoring and institutional control program. Institutional controls would restrict human access to the vault and prevent development of this portion of the Site. Currently, there is a chain link security fence enclosing the entire vault area. The total length of the fence is approximately 152 m (500 ft). As added protection, one warning sign would be posted at each side of the fence. A total of four warning signs would be needed. A long-term monitoring program would be implemented in order to assess the migration of contaminants, as well as to check the condition of the fence.

Alternative V-2: Sediment Excavation/Chemical Fixation/ On-Site Disposal

Under Alternative V-2, the 5,000 yd^3 of sediments within the vault would be excavated and transported to an on-site chemical fixation unit. In the treatment unit, the contaminated sediments would be mixed with fixating materials (e.g. sodium silicates, Portland cement and/or other proprietary chemicals) and water. After curing the mixture for 48 hours, the metal contaminants would be bound and/or physically encapsulated into the product material. Fixated material would not be hazardous as defined by RCRA.

The chemically fixated sediment would be disposed of in a disposal pit developed by enlarging the existing vault area. A larger disposal pit would be necessary because fixation would double the volume of the excavated sediments. The disposal pit would then be covered with top soil and seeded to establish a grass surface.

Alternative V-3: Sediment Excavation/Chemical Fixation/Off-Site Disposal

This alternative includes excavation of the 5,000 yd^3 of sediments in the vault, chemical fixation of the sediments on-site and off-site disposal of the treated sediments. Alternative V-3 is similar to Alternative V-2 in every aspect, except that the fixated sediments would be disposed of at an off-site disposal facility to be arranged for by NYSDEC.

Alternative V-6: Sediment Excavation/Off-Site Treatment and Disposal

In this remedial alternative, the 5,000 yd^3 of sediments in the vault would be excavated and transported to an off-site RCRA-permitted, hazardous waste treatment and disposal facility to be arranged for by NYSDEC.

After excavation, the vault would be filled with clean soil, covered with top soil, and seeded to establish a grass surface.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The above eleven alternatives were evaluated using evaluation criteria derived from the NCP and CERCLA Section 121, including CERCLA Section 121 (b)(1)(A-G). The criteria are as follows:

- Protection of human health and the environment
- Compliance with ARARs
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility or volume
- Short-term effectiveness
- Implementability
- Cost
- State acceptance
- Community acceptance

Each criterion will be briefly addressed in a comparative fashion for all the alternatives.

GROUNDWATER

Overall Protection of Human Health and the Environment

All of the groundwater alternatives are protective of human health and the environment since each alternative will attain the New York State and Federal ARARs for the groundwater at the conclusion of the remedial action. In addition, the groundwater alternatives will not pose a threat to Foundry Cove.

Compliance with ARARs

New York State and Federal ARARs will be attained at the conclusion of the remedial action for each of the groundwater alternatives. Under Alternatives GW-3 and GW-4, which are pump and treat options, the treated groundwater would be discharged to East Foundry Cove in accordance with New York State Pollutant Discharge Elimination System (SPDES) requirements.

Reduction of Toxicity, Mobility or Volume

The implementation of Alternative GW-3 or GW-4 would reduce the toxicity, mobility, or volume of contaminants in the groundwater by treatment. Alternative GW-1 would reduce the toxicity, mobility or volume of contaminants in the groundwater by natural attenuation.

Short-Term Effectiveness

Groundwater remediation is generally unattainable in the short-term. However, the aquifer is not presently being utilized as a potable water supply, so there is no short-term risk from the contaminated groundwater.

Short term risks from the drilling and installation of bedrock monitoring wells and/or construction and operation of the treatment processes will be mitigated through proper health and safety measures.

Long-Term Effectiveness and Permanence

Each of the groundwater alternatives is expected to attain State and Federal ARARs. The pump and treat options, GW-3 and GW-4, will attain the levels set by the ARARs within the same timeframe as Alternative GW-1, natural attenuation. Once cleanup goals are met, all three groundwater options will protect human health and the environment.

Implementability

All aspects of Alternative GW-1 would be implemented easily. There are no activities identified with this alternative which would require coordination with or approval by other agencies. Materials and services for implementation of Alternatives GW-3 and GW-4 are readily available from several vendors. These alternatives could be implemented easily. SPDES discharge limitations would be obtained from NYSDEC.

Cost

The costs associated with the groundwater alternatives are shown on Table 7.

State Acceptance

State acceptance of all three groundwater alternatives is favorable.

Community Acceptance

Since the local authorities wish to use the aquifer as a municipal water source, Alternative GW-1 may not be accepted by the public. Community acceptance of Alternatives GW-3 and GW-4 would probably be higher since these remedies actively treat the groundwater.

CONTAMINATED SOIL AND DUST

Overall Protection of Human Health and The Environment

Alternative S-1 provides minor protection to human health and the environment. The fencing would limit site access; however, future exposure to the contaminants would be possible. In addition, cadmium-contaminated soil may become entrained in storm water runoff and could be deposited in East Foundry Cove.

Alternative S-2 adequately protects public health with respect to the former battery facility, but fails to adequately protect the community in regard to the contamination on the battery plant grounds and in nearby residential yards.

Under Alternatives S-3 and S-4, the potential for exposure to the contaminated soil and dust via all pathways would decrease substantially. The cadmium-contaminated soil which would remain in the soil after remediation (concentrations less than 20 mg/kg) would be within health-based levels.

Compliance with ARARs

Based upon the land disposal restrictions (Land Ban) and in accordance with 40 C.F.R. Part 261, RCRA hazardous waste (i.e., listed or characteristic) which is excavated, treated and then redeposited in the same unit of contamination constitutes placement, and, therefore, the Land Ban requirements are potentially applicable or relevant and appropriate.

The cadmium-contaminated soils and dust are not RCRA listed wastes, although it is possible that they may be RCRA characteristic wastes. EP Toxicity tests will be performed to determine whether they are RCRA characteristic wastes.

Although the Land Ban requirements are not applicable in terms of a listed hazardous waste, they may be applicable if the waste is identified as RCRA characteristic hazardous waste. A RCRA characteristic hazadous waste is identified as a waste which exhibits the characteristics of either ignitability, corrosivity, reactivity or toxicity (using the extraction procedure (EP)).

Since RCRA Land Ban applies to waste which is excavated, treated and then redeposited in the same unit of contamination, the Land Ban requirements would be applicable or relevant and appropriate for all soils in Alternative S-3, and for the volatile organic-contaminated soil in Alternative S-4. This means that the alternatives involving fixation and enhanced volatilization would have to treat the soils to a level which satisfies the requirement for land disposal.

EPA is, presently undertaking a Land Ban rulemaking that will specifically apply to soil and debris. Until that rulemaking is completed, the CERCLA program will not consider Land Ban to be relevant and appropriate to soil and debris that does not contain RCRA restricted wastes.

The fixated soils in Alternative S-3 would occupy a larger portion of the Site than they presently occupy, so RCRA minimum requirements for design and operation would be relevant and appropriate.

While permits are not required for on-site remedial actions at Superfund sites, any on-site action must meet the substantive technical requirements of the permit process. Alternatives S-3 and S-4 would comply with all State and Federal requirements concerning potential air emissions (particulates and volatiles) during the excavation of the soil hot-spots. The chemical fixation treatment process (to treat the collected building dust and the excavated cadmium-contaminated soil) and the enhanced volatilization process (to treat the excavated volatile organic-contaminated soil) will satisfy the standards promulgated in 40 C.F.R. Part 264, Subpart X (Miscellaneous Treatment Units) and 40 C.F.R. Part 264, Subpart O (Incinerators), respectively. The requirements promulgated at 40 C.F.R. Part 264, Section 117; NYCRR Subpart 373.2 (post-closure care and use of property) are relevant and appropriate for all of the soil/dust options.

A location-specific ARAR, the National Historic Preservation Act (NHPA), would be complied with for all the soil/dust options. A determination of whether the alternatives would have any effect on cultural resources would be made during the design phase.

Reduction of Toxicity, Mobility, or Volume

Alternative S-4, which removes the contaminants from the Site above action levels, would significantly reduce the toxicity, mobility, or volume of the contaminants.

Short-Term Effectiveness

There are no short-term risks associated with Alternative S-1. Short-term risks to the community and workers during implementation of Alternatives S-2, S-3 and S-4 would include an increase in truck traffic, and possibly fugitive dust emissions, which would be mitigated through proper health and safety measures.

Long-Term Effectiveness and Permanence

Alternatives S-3 and S-4 would maintain reliable protection of human health and the environment once the remedial action is completed.

Implementability

All of the soil/dust options can be easily implemented.

Cost

The costs associated with the soil/dust options, listed on Table 7, are consistent with the NCP.

State Acceptance

Although the State is in agreement with the soil/dust proposed remedial action, it disagrees with the EPA recommended cadmium cleanup level of 20 mg/kg. The State believes that 20 mg/kg is unacceptable.

Community Acceptance

"No action" with respect to the soil/dust alternatives is clearly unacceptable to the community. The community will only accept alternatives which remove the cadmium-contaminated dust from inside the building and the cadmium-contaminanted soil from the battery plant grounds and adjacent residential yards.

VAULT ALTERNATIVES

Overall Protection of Human Health and Environment

Alternatives V-3 and V-6, which remove the vault and its contents from the Site, provide the highest degree of protection to human health and the environment. Alternative V-2, which fixates the contents of the vault and replaces them on-site, would also be protective of both human health and the environment, but to a lesser degree.

It is unknown at this time to what extent Alternative V-1 "no-action" is protective of human health and the environment.

Compliance with ARARs

As indicated above, based upon the land disposal restrictions under RCRA, waste which is excavated, treated and then redeposited in the same unit of contamination constitutes placement. Therefore, the Land Ban requirements would be applicable or relevant and appropriate for Alternative V-2. This means that the fixation process would have to treat the contaminated sediments to a level which satisfies the requirements for land disposal. As discussd above, until the EPA rulemaking is completed, the CERCLA program will not consider Land Ban to be relevant and appropriate to soil and debris that does not contain RCRA restricted wastes.

While permits are not required for on-site remedial actions at Superfund sites, any on-site action must meet the substantive technical requirements of the permit process. Alternatives V-2, V-3 and V-6 would meet all Federal and State requirements concerning potential emissions of particulates to the air during excavation of the vault.

The chemical fixation treatment process, used to treat the sediments in the vault, under Alternative V-3, would satisfy the standards promulgated at 40 C.F.R. Part 264, Subpart X (Miscellaneous Treatment Units).

The requirements promulgated at 40 C.F.R. Part 264, Section 117, 6 NYCRR Subpart 373.2 (post-closure care and use of property) are relevant and appropriate for all of the vault options.

Long-Term Effectiveness and Permanence

Alternative V-3 which calls for the excavation of the vault offers the highest degree of on-site long-term permanence. Removal of the vault in conjunction with the overall cleanup of the Site would allow the Site to be used for a variety of purposes without endangering human health. Leaving the vault in place is the least protective remedy. The long-term reliability of the V-1 option is in question because the useful life of the vault is uncertain.

Reduction of Toxicity, Mobility or Volume

Alternatives V-3 and V-6 will significantly reduce the mobility, toxicity or volume of the contaminants on-site because the vault sediments are removed and are rendered immobile by fixation.

Short-Term Effectiveness

There would be no short-term risks associated with implementing Alternative V-1. The only short-term risks associated with Alternatives V-2, V-3 and V-6 would be the exposure of on-site workers and nearby residents to cadmium-contaminated dust during excavation of the vault, and the risks caused by increased truck traffic along Main Street and Kemble Avenue. These risks would be managed by dust control techniques during excavation, and through proper health and safety measures.

Implementability

All aspects of Alternative V-3 are easily implemented.

Cost

The estimated present worth of removal of the vault is $3,500,000. Although Alternative V-1 is less expensive than Alternative V-3, Alternative V-1 would not provide the most cost-effective remedy to protect human health and the environment. In addition, the proposed excavation of the vault would result in cost savings (by avoiding remobilization activities) if EPA has to excavate the vault at a future date.

State Acceptance

After the public meeting the State conducted a thorough analysis of the RI/FS and public comments and concluded that the vault should be removed from the Site.

Community Acceptance

In written and oral comments to the Agency, the community has expressed its extreme concern related to leaving the vault in place. Recognizing that the vault has not contaminated the groundwater, the community nonetheless is concerned that the vault should be removed because it is a continuing threat to their community.

DESCRIPTION OF THE SELECTED REMEDY

The major components of the selected remedy can be summarized as follows:

- Decontamination of the inside surfaces and contents of the former battery facility to remove the heavy metal-contaminated dust.
- Excavation of the cadmium-contaminated soil to a level of 20 mg/kg on the battery plant grounds and the residential yards impacted by the Site.
- Excavation of the on-site dredge spoils vault.
- Fixation of the excavated soil, dust and vault sediments.
- Off-site disposal of the cadmium-contaminated soils, sediments, and dust at a facility to be arranged for by NYSDEC.
- Excavation of the volatile organic-contaminated soil hotspots followed by enhanced volatilization and replacement of the clean residuals on-site.
- Backfilling of the excavated areas with clean fill.
- Institutional controls to restrict development of the aquifer for potable or municipal use, until State or Federal applicable or relevant and appropriate requirements are reached.
- Long-term monitoring of the groundwater underlying the Site.
- Evaluation and performance of minor repairs, if needed, to the inoperable sprinkler and heating systems inside the former battery facility.

STATUTORY DETERMINATION

Section 121 of CERCLA requires that EPA select a remedy which is protective of human health and the environment, attains ARARs, is cost effective, and utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

Based upon the analysis presented in the Comparative Analysis of Alternatives and Selected Remedy sections, the following conclusions were reached regarding the groundwater, soil/dust and vault alternatives.

Attainment of ARARs

The selected remedy will attain all ARARs. Contaminated soils and debris are not RCRA listed wastes based on available information. In addition, these wastes are not expected to be characteristic. Hazardous substances with high concentrations of contaminants will be treated to levels that will not fail hazardous characteristic tests. Similarly, soils with low concentrations of hazardous substances are not expected to be characteristic wastes.

RCRA requirements in 40 C.F.R. Part 264 Subpart G - Closure and Post-Closure and the New York State equivalent at 6 NYCRR Subpart 373.2, are relevant and appropriate for the treated soil which will be redeposited on the Site after treatment by the enhanced volatilization process. The cleanup levels for the soils are consistent with an alternative clean closure which is protective for all routes of exposure and will not require long-term management or engineering controls.

RCRA general treatment and storage standards for units are relevant and appropriate for treatment conducted on-site as are the requirements at 40 C.F.R. Part 264 Subpart O - Incinerators; 6 NYCRR 373-2.15 _et seq._, for the enhanced volatilization process.

Although it is not anticipated that hazardous waste will be transported off-site, if it is, the requirements at 40 C.F.R. Part 262, 6 NYCRR Part 372, relating to generators, transporters and manifesting would be met.

At this time, EPA is undertaking a RCRA land disposal rulemaking (Land Ban) that will specifically apply to soil and debris. Until that rulemaking is completed, the CERCLA program will not consider the Land Ban to be relevant and appropriate to soil and debris that does not contain RCRA restricted wastes.

The selected response action meets the ARARs for the groundwater portion of the remedy. At the conclusion of the remedial action, EPA Maximum Contaminant Levels (MCLs) will be met through the natural attenuation process. In addition, the remedy attains RCRA Ground Water corrective Action requirements by meeting the requirements of a health based Alternate Concentration Limit (ACL).

Lastly, 6 NYCRR Part 211: General Prohibitions, 6 NYCRR Part 212: Process and Exhaust and/or Ventilation Systems, and 6 NYCRR Part 257: Air Quality Standards are applicable.

Utilization of Permanent Solutions and Alternative Treatment Tehnologies or Resource Recovery Technologies to the Maximum Extent Practicable (MEP)

GROUNDWATER

The excavation and treatment of soils contaminated with volatile organics will remove the source of contaminants to the groundwater.

Due to the hydraulic conditions of the aquifer, the contaminant plume in the groundwater would disperse and migrate at a rapid rate. Therefore, it is expected that State and Federal standards will be achieved through natural attenuation (Alternative GW-1) within three to ten years after the removal of the source contamination. This time-frame is comparable to the time period required for active remediation (Alternatives GW-3 and GW-4). Consequently, the selection of Alternative GW-1 was deemed to be the most appropriate solution for groundwater remediation.

SOILS AND BUILDING DUST

The selected remedy, Alternative S-4, (Building Decontamination) Soil Excavation/Fixation/Enhanced Volatilization/Off-Site Disposal) satisfies the statutory preference for treatment as a principal element. More significantly, the soil will be cleaned to a level that is protective of public health and the environment and provides a permanent solution through the selected alternative.

VAULT

The selected alternative, Alternative V-3 (sediment excavation/ chemical fixation/off-site disposal), would comply with applicable or relevant and appropriate standards. It meets the statutory preference for treatment to the maximum extent practicable. In addition, Alternative V-3 provides the most permanent remedy for the Site.

Preference for Treatment as a Principal Element

The remedy selected, satisfies the statutory preference for treatment as a principal element and addresses, to health-based levels, the principal threats posed by this operable unit of the Site.

OPERATION AND MAINTENANCE (O&M)

O&M are those costs required to operate and maintain the remedial action throughout its lifetime. These activities ensure the lifetime effectiveness of the remedial alternatives selected.

O&M requirements (primarily groundwater monitoring) are eligible for Superfund monies for a period of up to one year to assure that human health and the environment are being protected. In subsequent years, any additional O&M costs would be paid for with State funds.

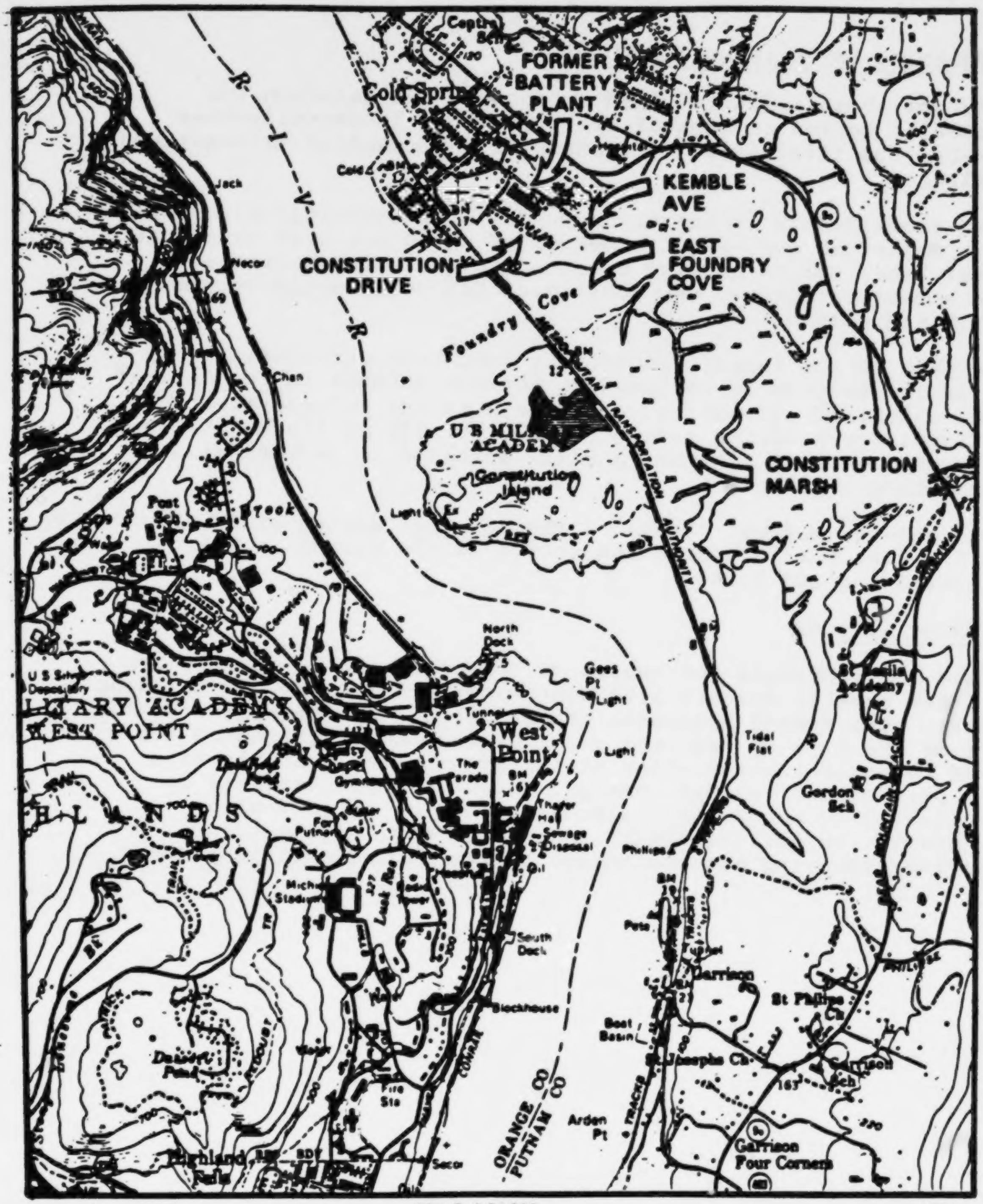
As part of the remedial action, a long-term groundwater sampling program is included to monitor changes in the nature and extent of contamination at the Site and to determine the effectiveness of the remedy. Also, as part of the monitoring program, several monitoring wells screened in bedrock will be installed on-site.

One hundred percent (100%) of the remedial design will be funded by EPA. Cost sharing for construction of the remedy is 90% Federal and 10% State.

FUTURE ACTIONS

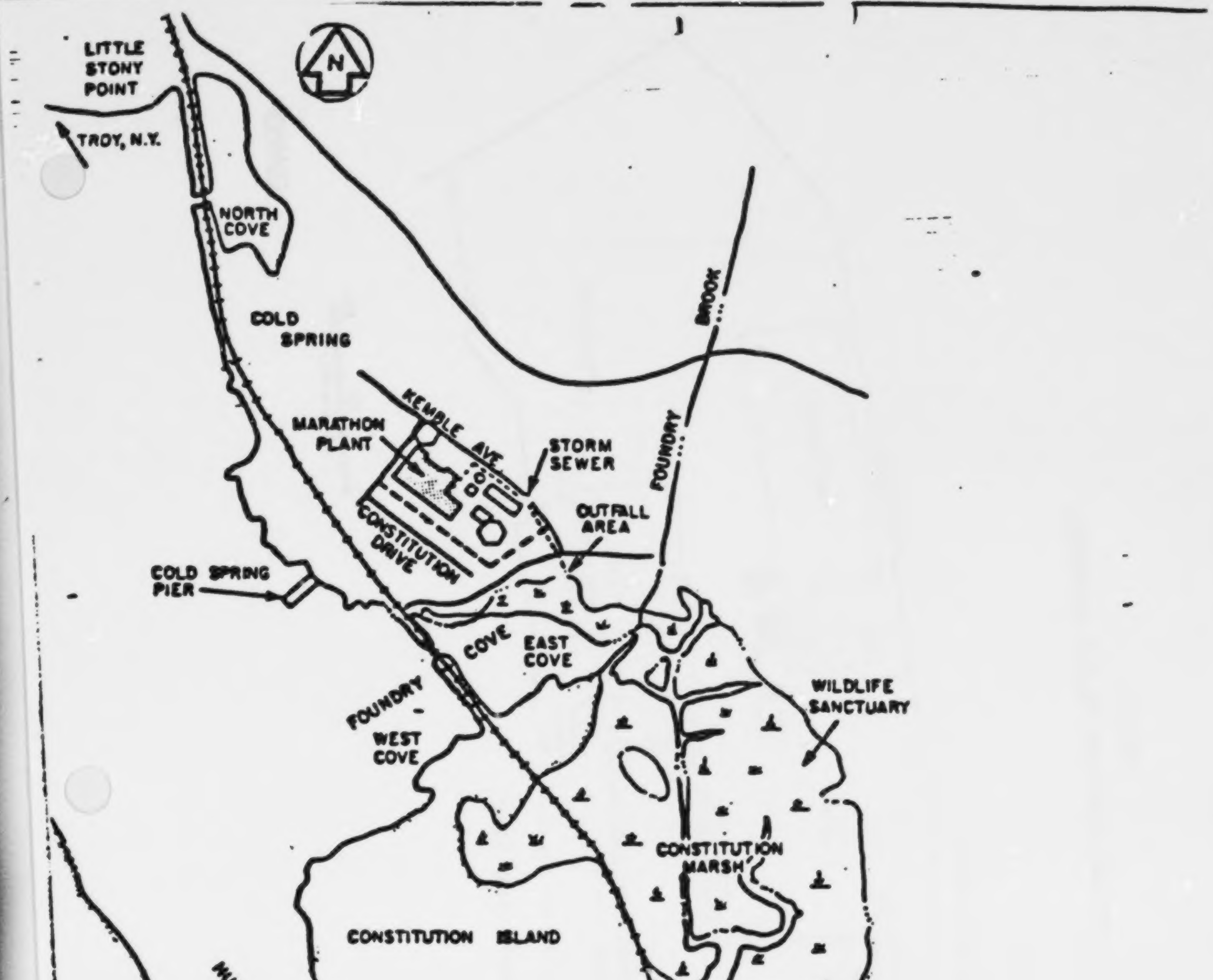
This ROD addresses the source of contamination by remediation of the on-site and off-site contaminated soils and the building dust. The remedy addresses the principal threats posed by Area II of the Site by removing and treating the contaminated soils and by natural attenuation of the groundwater contamination. As part of the remedial design, additional samples will be collected to determine the areal extent of the off-site contaminated soil requiring excavation and treatment. Further sampling and monitoring of the groundwater is planned.

FIGURE 1
MARATHON BATTERY SITE
SITE LOCATION MAP



SOURCE: USGS WEST POINT QUADRANGLE

EBASCO



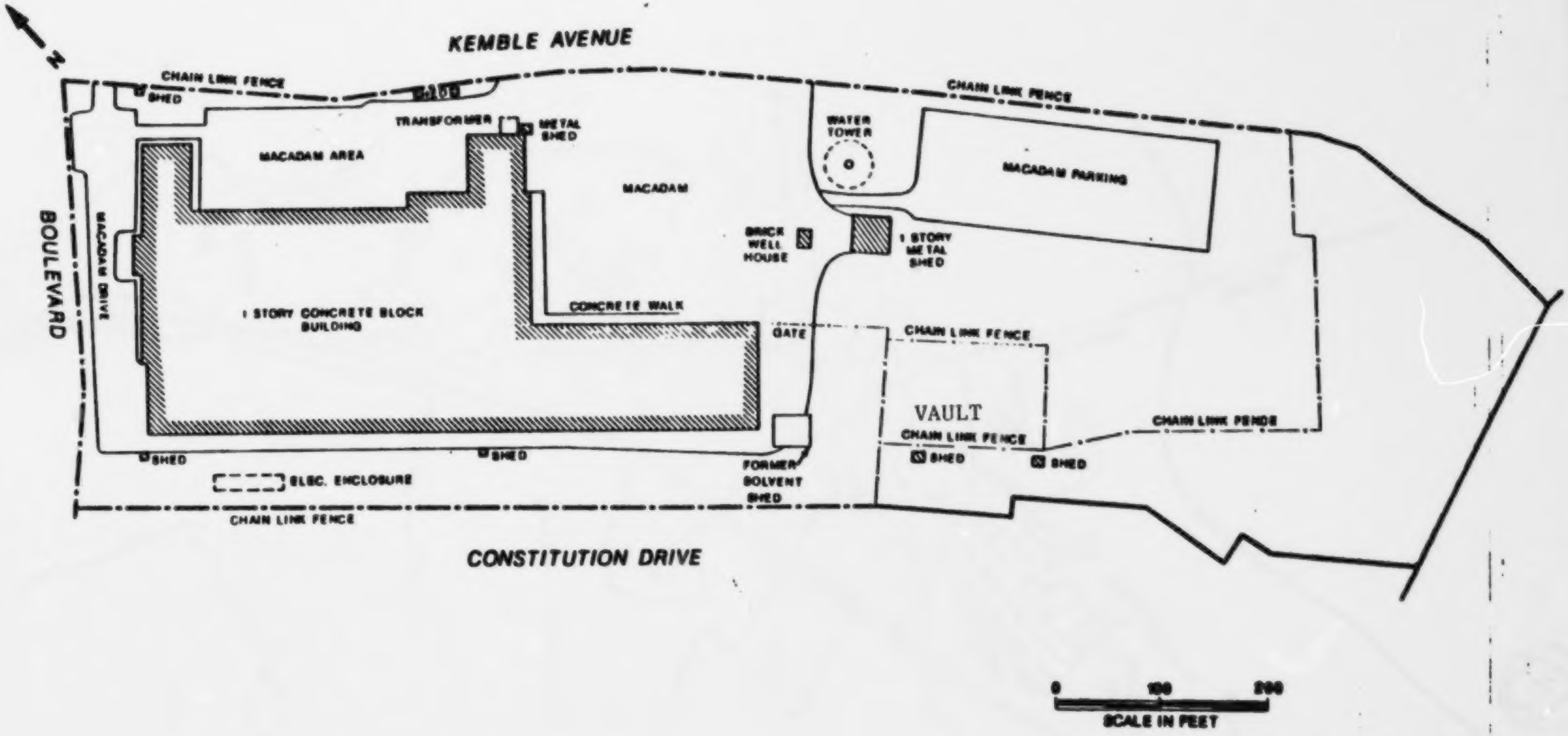
RES

FOUNDRY COVE AND VICINITY

Figure 2

FIGURE 3

FORMER BATTERY PLANT GROUNDS



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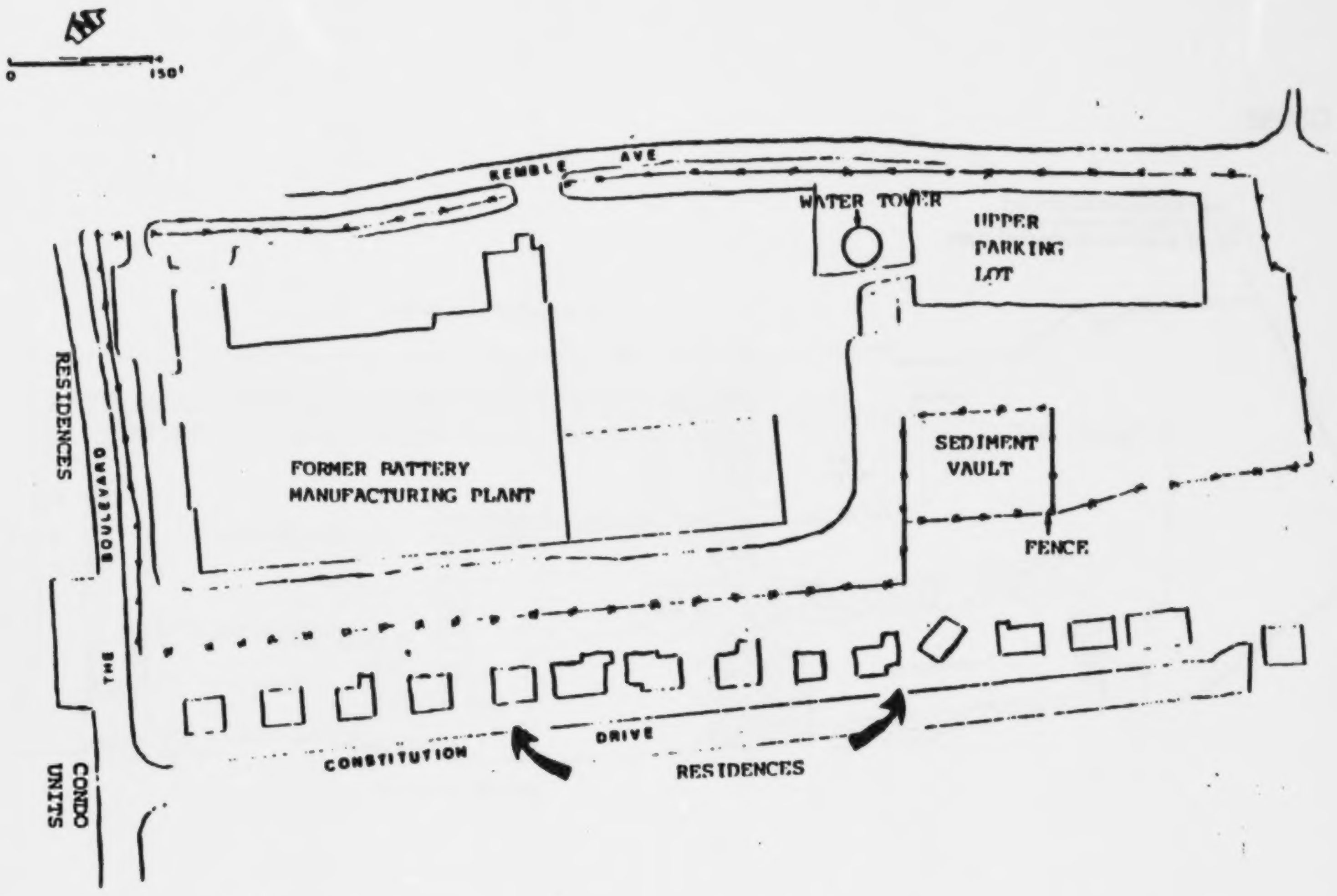
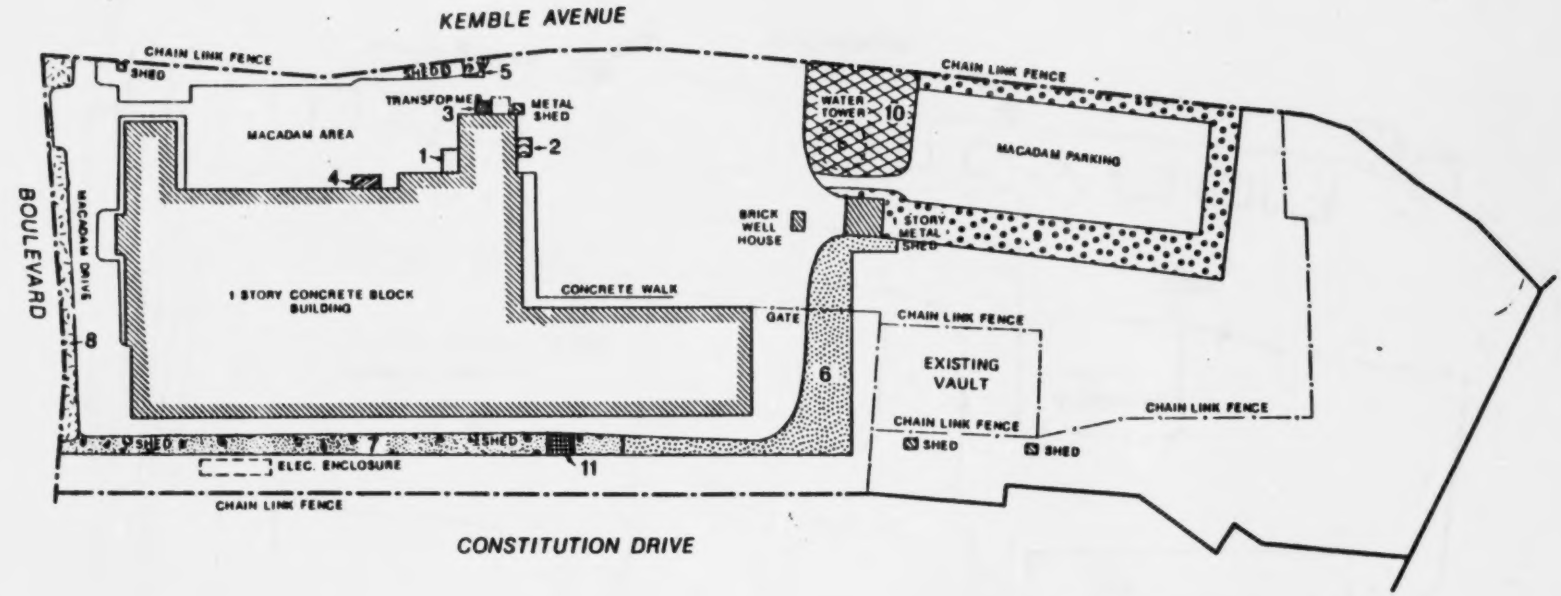


SPILL PREVENTION & EMERGENCY RESPONSE DIVISION	EPA PM E. DOMINACH	FIG 4
In association with ICF Inc. Jacobs Engineering Inc. & Tetra Tech Inc.	TAT PM E. BIRCKHEAD	MARATHON BATTERY SITE PLAN

FIGURE 5

AREA OF METAL AND ORGANIC CONTAMINATED SOIL



NOTE: THE EXISTING LOCATIONS OF THE CONTAMINANT ARE INDICATED BY THE DOTTED OR SHADED AREA.

EBASCO

TABLE

METAL CONCENTRATIONS IN CONTAMINATED SOILS

Location	Sample Depth cm (in)	No. of Samples	Concentrations (mg/kg) Cd Range	Cd Mean	Co Range	Co Mean	Ni Range	Ni Mean
1	0-15.2 (0-6)	1	-	5580	-	127	-	2040
	15.2-30.5 (6-12)	1	-	178	-	ND	-	164
	30.5-45.7 (12-18)	1	-	306	-	ND	-	211
2	0-15.2 (0-6)	1	-	989	-	27	-	61
	15.2-30.5 (6-12)	1	-	495	-	9.2	-	101
	30.5-45.7 (12-18)	1	-	1140	-	13	-	80
3	0-15.2 (0-6)	1	-	1800	-	73	-	1650
4	0-15.2 (0-6)	1	-	114	-	38	-	1030
5	0-15.2 (0-6)	1	-	312	-	13	-	277
6	0-15.2 (0-6)	5	126-414	217	18-22	20	118-325	227
	15.2-30.5 (6-12)	2	62-98	80	-	13	93-168	131
	30.5-45.7 (12-18)	1	-	13	-	14	-	39
7	0-15.2 (0-6)	3	11-171	74	-	9.2	4-235	110
	15.2-30.5 (6-12)	2	6-37	22	8.9-161	85	26-59	43
	30.5-45.7 (12-18)	1	-	8.8	-	15	-	39
8	0-15.2 (0-6)	5	23-43	34	5-9	7	40-93	67
	15.2-30.5 (6-12)	2	139-379	259	12-18	15	68-204	166
9	0-15.2 (0-6)	4	247-1360	817	12-43	30	87-953	538
	15.2-30.5 (6-12)	2	139-379	259	12-18	15	68-204	166
10	0-15.2 (0-6)	7	12-435	96	10-16	13	38-236	87

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* For locations, see Figure 5-7

TABLE 2

VOLATILE ORGANIC - CONTAMINATED SOIL CONCENTRATION AND EXTENT

A. CONCENTRATION

LOCATION*	Sampling Depth M (ft)	Number of Samples	Organic Contaminant	TCE Concentration (mg/kg)	
				Range	Mean
11	3.7-4.3 (12-14)	2	TCE	13-30	22
	10.7-11.3 (35-37)	1	TCE	-	37
12	15.2-159 (50-52)	1	Chloroform	-	120

B. EXTENT**

LOCATION*	Area M^2 (ft^2)	Depth m (ft)	Volume m^3 (yd^3)
11	150 (1600)	3.1 (10)	460 (600)
	150 (1600)	3.1 (10)	460 (600)
12	150 (1600)	3.1 (10)	460 (600)

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* For locations, see Figure 5-7.

** Defined based on a remediation level of 5 ug/kg.

TA 2 con't

Page No.
08/06/86

SAMPLING RESULTS
MARATHON BATTERY
COLD SPRINGS
NEW YORK
Residential Yards

SAMPLE ID	DATE SAMPLED	DATE SENT TO LAB	DATE RESULTS RECEIVED	CADMIUM (PPM)	COBALT (PPM)	LEAD (PPM)	NICKEL (PPM)	ZINC (PPM)	LOCATION	COMMENTS
008726	07/09/86	07/14/86	07/29/86	27.70	9.00	197.60	61.90	331.00	NE CORNER MOVING WEST	SOIL #1
008727	07/09/86	07/14/86	07/29/86	41.50	5.00	40.40	58.80	55.10	NORTH FENCE MOVING WEST	SOIL #2
008728	07/09/86	07/14/86	07/29/86	42.80	8.00	39.60	81.40	62.80	NORTH FENCE MOVING WEST	SOIL #3
008729	07/09/86	07/14/86	07/29/86	22.80	6.00	41.70	40.10	64.00	NORTHWEST CORNER	SOIL #4
008730	07/09/86	07/14/86	07/29/86	283.90	11.00	53.20	293.40	104.30	50 FEET FROM N & S BUILD	SOIL #5
008567	07/09/86	07/14/86	07/29/86	430.20	23.00	29.00	721.00	72.40	SOUTHERN PERM GOING WEST	SOIL #6
008568	07/09/86	07/14/86	07/29/86	932.20	17.00	26.80	547.70	105.30	SOUTHERN PERM GOING WEST	SOIL #7
008566	07/09/86	07/14/86	07/29/86	27.10	11.00	42.50	74.50	118.00	WEST FENCE BY RESIDENTS	SOIL #8
008731	07/10/86	07/14/86	07/29/86	10.50	10.00	44.10	29.10	666.00	NE CORNER MOVING SOUTH	SOIL #9
008732	07/10/86	07/14/86	07/29/86	7.30	9.00	36.80	26.20	138.70	EAST PERM MOVING SOUTH	SOIL #10
008733	07/10/86	07/14/86	07/29/86	8.30	9.00	38.00	26.70	168.00	EAST PERM MOVING SOUTH	DUPE TO 10
008736	07/10/86	07/14/86	07/29/86	14.40	8.00	72.10	34.90	110.90	EAST PERM MOVING SOUTH	SOIL #11
008737	07/10/86	07/14/86	07/29/86	22.80	5.00	50.40	32.40	135.60	EAST PERM MOVING SOUTH	SOIL #12
008738	07/10/86	07/14/86	07/29/86	60.60	2.00	41.10	60.30	94.60	EAST PERM MOVING SOUTH	SOIL #13
008739	07/10/86	07/14/86	07/29/86	30.10	9.00	55.40	59.10	90.90	SOUTHEAST PERM BY W T	SOIL #14
008570	07/10/86	07/14/86	07/29/86	3.10	7.00	23.10	18.30	66.20	SE GATE DRIVE DISCRETE	SOIL #15

TABLE 2 con't

SAMPLING RESULTS
MARATHON BATTERY
COLD SPRINGS
NEW YORK
Residential Yards

SAMPLE ID	DATE SAMPLED	DATE SENT TO LAB	DATE RESULTS RECEIVED	CADMIUM (PPM)	COBALT (PPM)	LEAD (PPM)	NICKEL (PPM)	ZINC (PPM)	LOCATION	COMMENTS
008735	07/10/86	07/14/86	07/29/86	17.30	12.00	28.00	24.00	76.90	LOW AREA NEAR SE GATE	SOIL #16
008734	07/10/86	07/14/86	07/29/86	18.10	9.30	32.20	29.30	93.90	LOW AREA NEAR SE GATE	DUPE TO 16
008569	07/10/86	07/14/86	07/29/86	433.00	16.00	255.60	235.60	213.00	BY WATER TOWER	SOIL #17
008572	07/10/86	07/14/86	07/29/86	324.20	13.00	119.40	274.20	110.80	STORM DRAIN N OF SE GATE	SOIL #18
008571	07/10/86	07/14/86	07/29/86	613.10	50.00	110.80	277.60	244.00	LOW AREA W SIDE OF BDG	SOIL #19
008740	07/10/86	07/14/86	07/29/86	0.30	1.00	2.50	2.00	1.30	TRIP BLANK	SOIL #20
5487	07/10/86	07/14/86	08/06/86	0.30	0.10	0.25	0.20	2.20	LOW AREA BY SE GATE	AIR #1
5485	07/10/86	07/14/86	08/06/86	0.30	0.10	0.25	0.20	0.30	SOUTHERN BACK PARK LOT	AIR #2
5489	07/10/86	07/14/86	08/06/86	0.30	0.10	0.25	0.20	0.30	N W SIDE OF BUILDING	AIR #3
5486	07/10/86	07/14/86	08/06/86	0.30	0.10	0.25	0.20	0.30	NORTHEAST ENTRANCE	AIR #4
BA	07/10/86	07/14/86	08/06/86	0.30	0.10	0.25	0.20	0.30	TRIP BLANK	AIR #5

TABLE 3

AVERAGE U.S. SOIL CONCENTRATIONS FOR CONTAMINANTS FOUND AT THE MARATHON BATTERY COMPANY SITE

Parameter	Concentrations
Cadmium	0.01-3.5 mg/kg(1)
Nickel	11.1-86.5 mg/kg(1)
Cobalt	1.0-6.0 mg/kg(2)
Benzo(a)Pyrene	0.04 to 1.3 mg/kg (rural areas)
Tetrachloroethylene	<0.005 mg/kg
Chloroform	Not Known
Trichloroethylene	Not Known
1,1,1-Trichloroethane	Not Known
1,2-dichloroethane	Not Known

(1) Toth, S., Unpublished New Jersey Soils Data, Cook College, Rutgers University 1970's (from NJDEP files)

(2) Field Studies Branch, Exposure Evaluation Division, U.S. EPA, Memo to Junio Morales-Sanchez, Director, Region II Enforcement

TABLE 4

INORGANIC CONTAMINATION IN GROUNDWATER[1]

Compound/Well	3S	2S	7SA	6S	6I	4I	4I Not Filtered	5S	5I	V1	V2	V3	V4	V5
INORGANICS														
Aluminum	174	106	-	-	-	-	16400	-	28	-	-	-	-	-
Antimony	-[2]	-	-	-	-	-	-	-	73	-	-	-	-	-
Arsenic	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barium	34	-	-	23	-	-	129	-	-	23	-	35	-	-
Baryllium	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cadmium	-	-	-	-	-	-	-	6.0	-	-	-	-	-	-
Calcium	79700	41900	39300	84200	17800	62700	7560	7420	6200	88400	70700	46300	70400	63300
Chromium	18	-	-	-	-	-	25	-	-	-	-	-	-	-
Cobalt	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Copper	-	-	-	-	-	-	79	12	-	-	-	-	-	-
Iron	62	229	-	-	-	-	39800	67	-	-	-	81	-	-
Lead	-	-	-	-	-	-	24	-	-	-	-	-	-	-
Magnesium	3939	1400	8220	18400	19700	17300	25600	23300	23300	19400	20600	9680	21300	14[illegible]00
Manganese	209	322	77	21	47	108	2000	35	112	27	188	-	16	8.0
Mercury	-	-	-	-	0.26 J[3]	-	-	-	-	-	-	0.18 J	-	-
Nickel	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potassium	1740	1990	1850	1540	-	1820	4420	2700	2250	1660	2190	1840	1500	-
Selenium	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Silver	-	-	-	-	-	-	-	-	-	-	-	-	-	129
Sodium	16000	11400	53700	13100	-	14600	15100	18600	9660	13300	16500	26000	13700	14500
Thallium	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tin	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vanadium	-	-	-	-	-	-	15	-	-	-	-	-	-	-
Zinc	58	20	-	35	-	-	120	-	-	-	14	93	-	-

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[1] Concentration in ug/l.
[2] - = Not Detected.
[3] J = Estimated Concentration.

TABLE 4 con't

ORGANIC CHEMICAL CONTAMINATION IN GROUNDWATER COMPARISON OF FIRST AND SECOND ROUNDS OF GROUNDWATER SAMPLES

	Compounds Identified	
Well Number	First Round Samples	Second Round Samples
3 S	ND	Trichloroethylene 2 ug/l J
MB-1 (NYSDEC)	(Not Sampled)	Trichloroethylene 2 ug/l J
2 S	ND	Trichloroethylene 4 ug/l J
7 SA	Trichloroethylene 100 ug/l Chloroform 11 ug/l 1,1,1-Trichloroethene 18 ug/l	Chloroform 11 ug/l 1,1,1-trichloroethane 8 ug/l Trichloroethylene 82 ug/l
6 I	ND	ND
6 S	ND	1,1,1-Trichloroethane 2 ug/l J Trichloroethene 6 ug/l
MB-3 (NYSDEC)	(Not Sampled)	1,1,1-Trichloroethane 9 ug/l Trichloroethylene 65 ug/l
4 I	ND	ND
4 D	ND	ND
5 S	ND	Chloroform 1 ug/l J 1,1,1-Trichloroethane 1 ug/l J
5 I	ND	ND
MB 4 (NYSDEC)	(Not Sampled)	ND
V 1	Trichloroethylene 8 ug/l	Chloroform 19 ug/l Bromochloromethane 1 ug/l J
V 2	Fluorathene 3 ug/l Pyrene	ND
V 3	1,1,1-Trichloroethane 5.5 ug/l Trichloroethylene 26 ug/l Tetrachloroethane 2.4 ug/l	ND
V 4	ND	ND
V 5	ND	ND
Trip Blank		Totl Xylenes 1 ug/l J

ND = Not Detected.
J = Estimated Concentration.

TABLE 5

CADMIUM, COBALT AND NICKEL CONTAMINATION IN CONCRETE CORES AND WIPE SAMPLES (mg/kg)

Sample	Cadmium	Cobalt	Nickel
Concrete Cores			
1	-	66	32
2	-	8.0	20
3	-	8.4	27
4	-	7.5	27
5	-	18	200
6	-	7.4	21
7	-	7.1	21
Wipe Samples			
8	182	4.8	156
9	625	16	535
10	925	19	580
11	31	3.6	128
12	253	5.8	193
13	510	12	390
14	955	25	920
15	4830	153	5310
16	78	8.8	412
17	128	3.7	150
18	15300	462	21500
19	88	1.2	36
20	341	8.8	204
21	24	1.9	61
22	565	20	555
23	136	9.1	198
24	102	34	103
25	366	15	540
26	125	7.5	222
27	835	23	855
28	950	30	1140
29	735	20	645
30	72	2.0	60
31	72	1.8	64
32	263	7.2	240
Blank	0.25	0.60	0.65

TABLE 5 con't

METAL CONCENTRATIONS IN BUILDING DUST(1)

A. Dust from Building Surfaces (Walls, Ceilings, Floors, etc.)

	Concentration, mg/kg		
Contaminant	**Range**	**Average**	**Median**
Cadmium	24 - 15,300	1462	510
Cobalt	1.9 - 462	45	15
Nickel	61 - 21,500	1821	535

B. Dust from Stacked Book Surfaces (Plastic Covers, Boxes, etc.)

	Concentration, mg/kg		
Contaminant	**Range**	**Average**	**Median**
Cadmium	72 - 253	129	102
Cobalt	1.2 - 34	9	3.7
Nickel	60 - 193	108	103

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(1) Results from Ebasco Sampling

TABLE 5 con't
RESULTS OF ANALYSIS OF WIPE SAMPLES RECEIVED 6 AUGUST 1985

Page 2 of 2

Parameter	Unit	A-36* Plant Area	174* Plant Area	3426* Plant Area
Cadmium	mg/filter	8.5	65	6.5
Cobalt	mg/filter	0.45	<0.01	0.15
Lead	mg/filter	1.5	0.23	7.5
Nickel	mg/filter	13	78	8.9
Zinc	mg/filter	0.96	0.84	0.40
EA Laboratory Number		7120	7121	7122

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* Area wiped: 100 cm^2.

APPENDIX B

TABLE 5 con't

RESULTS OF ANALYSIS OF DUST SAMPLES RECEIVED 6 AUGUST 1985

Parameter	Unit	Discrete Rafter Area of #6	Discrete Floor	Discrete Dust Box Top Palates
Cadmium	mg/kg	120,000	2,000	16,000
Cobalt	mg/kg	<4	36	<2
Lead	mg/kg	530	260	1400
Nickel	mg/kg	130,000	2,400	22,000
Zinc	mg/kg	1,200	580	2,500
EA Laboratory Number		7123	7124	7125

TABLE 6

SUMMARY OF REMEDIAL TECHNOLOGY SCREENING
GROUNDWATER

Remedial Technologies	Further Evaluation	Eliminated
No Action	X	
Containment		
Capping		
o Clay Cap		X
o Asphalt Cap	X	
o Concrete Cap		X
o Synthetic Membranes		X
Subsurface Barriers		
o Sheet piling		X
o Slurry Walls	X	
o Grout Curtains		X
Treatment and Disposal Pumping		
o Suction Wells		X
o Deep Wells	X	
o Well Point Systems		X
On-Site Treatment		
o Biological Treatment		X
o Air Stripping	X	
o Steam Stripping		X
o H_2O_2 - UV Oxidation	X	
o Carbon Adsorption	X	
o Centrifugation		X
o Chemical Oxidation/Reduction	X	
o Distillation		X
o Evaporation		X
o Filtration	X	
o Reverse Osmosis	X	
Off-Site Treatment		
o Publicly Owned Treatment Works (POTW)	X	

TABLE 6 Con't

SUMMARY OF REMEDIAL TECHNOLOGY SCREENING
SOIL

Remedial Technologies	Further Evaluation	Eliminated
No Action	X	
Containment		
Capping		
o Clay Cap		X
o Asphalt Cap	X	
o Concrete Cap		X
o Synthetic Membranes		X
o Multimedia Cap	X	
Removal		
o Excavation	X	
On-Site or Off-Site Treatment		
Physical Treatment		
o Solid Separation	X	
Chemical Treatment		
o Acid Extraction		X
o Fixation	X	
Thermal Treatment		
o Incineration		X
o Roasting		X
o Enhanced Volatilization	X	
o Thermoplastic Solidification		X
In Situ Treatment		
Biological		
o Biodegradation		X
Chemical		
o Soil Flushing		X

TABLE 6 Con't

SUMMARY OF REMEDIAL TECHNOLOGY SCREENING
SOIL

Remedial Technologies	Further Evaluation	Eliminated
Thermal		
o Vitrification	X	
Disposal		
Disposal as Hazardous Waste		
o Construct On-Site RCRA Landfill	X	
o Construct Off-Site RCRA Landfill		X
o Existing RCRA Landfill	X	
Disposed as Non-Hazardous Waste		
o Construct On-Site Landfill	X	
o Construct Off-Site Landfill		X
o Existing Local Landfill	X	
Transportation		
o Truck	X	
o Train		X
o Barge		X

TABLE 6 Con't

SUMMARY OF REMEDIAL TECHNOLOGY SCREENING
SEDIMENT IN THE VAULT

Remedial Technologies	Further Evaluation	Eliminated
No Action	X	
Containment		
Capping		
o Clay Cap		X
o Asphalt Cap	X	
o Concrete Cap		X
o Synthetic Membranes		X
Subsurface Barriers		
o Sheet Piling		X
o Slurry Walls	X	
o Grout Curtains		X
Removal		
o Excavation	X	
On-Site or Off-Site Treatment		
Physical Treatment		
o Solids Separation	X	
Chemical Treatment		
o Acid Extraction		X
o Fixation	X	
Thermal Treatment		
o Incineration		X
o Roasting		X
o Thermoplastic Solidification		X
In-Situ Treatment		
Biological		
o Biodegradation		X
Chemical		
o Soil Flushing		X
o Solification/Fixation	X	

TABLE 6 Con't

SUMMARY OF REMEDIAL TECHNOLOGY SCREENING
SEDIMENT IN THE VAULT

Remedial Technologies	Further Evaluation	Eliminated
Thermal		
o Vitrification	X	
Disposal		
Disposal as Hazardous Waste		
o Construct On-Site RCRA Landfill	X	
o Construct Off-Site RCRA Landfill		X
o Existing RCRA Landfill	X	
Disposed as Non-Hazardous Waste		
o Construct On-Site Landfill	X	
o Construct Off-Site Landfill		X
o Existing Local Landfill	X	
Transportation		
o Truck	X	
o Train		X
o Barge		X

Table 7
Summary of costs

Alternative	CAPITAL ($1,000)	ANNUAL O&M COST ($1,000/YR)	PRESENT WORTH ($1,000)
1) GW-1 No Action	0	17 (1-30 yr)	260
2) GW-3 Pumping/Carbon Adsorption/ On-Site Discharge	1,520	700 (1 yr) 677 (2 yr)	2,800
3) GW-4 Pumping/H202- UV Oxidation/On-Site Discharge	1,600	861 (1 yr) 838 (2 yr)	3,380
4) S-1 No Action	14	21 (1-30 yr)	340
5) S-2 Building Decontamination/ Off-Site Disposal/Soil Capping	1,100	20 (1-30 yr)	1,400
6) S-3 Building Decontamination/ Fixation/Enhanced Volatilization On-Site Disposal	3,600	368 (1 yr) 16 (2-30 yr)	4,180
7) S-4 Building Decontamination/Fixation Enhance Volatilization Off-Site Disposal	4,900	380 (1 yr)	5,270
8) V-1 No Action	230	15 (1-30 yr)	230
9) V-2 Sediment Excavation/Fixation/On-Site Disposal	2,930	393 (1 yr) 15 (2-30 yr)	3,520
10) V-3 Sediment Excavation Fixation/ Off-Site Disposal	3,500	378 (lyr)	4,480
11) V-6 Sediment Excavation/Off-Site Treatment & Disposal	3,930	0.2	3,930

TABLE 8

DETECTED CONCENTRATIONS OF INDICATOR CONSTITUENTS IN SOIL DUST AND GROUNDWATER, WATER QUALITY CRITERIA, AND CANCER POTENCY SLOPES

Parameter	Soil (mg/kg)	Water (ug/1)	Dust (mg/kg)	Ambient Water Quality Criteria (ug/1) For the Protection of Human Health		NYSDEC (6)	USEPA Cancer Potency Slope (mg/kd/day^{-1})	
				USEPA	NYSDEC (5)		Oral	Inhalation
Cadmium	ND(2) - 5580	ND-6.0	31-15300	10.0	10.0	—	—	6.1
Nickel	ND - 2040	ND	60-21500	15.4	—	—	—	—
Trichloroethylene	ND - 0.03	ND - 100	NA(3)	5.0	10.0	5.0	0.011	0.0043
Chloroform	ND - 0.12	ND - 11.0	NA	100	100	100(7)	0.081	0.081
1,1,1-Trichloroethane	ND	ND - 2.4	NA	200	—	5.0	0.0573(4)	—
Tetrachloroethylene	ND - 0.015	ND - 2.4	NA	0(1)	—	5.0	0.051	0.0017
1,2-dichloroethane	ND	ND - 15.0	NA	5.0	—	5.0	0.91	0.91

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(1) MCLG
(2) ND = Not Detected
(3) NA = Not Analyzed
(4) Based on cancer potency of 1,1,2-trichloroethylene
(5) New York State Water Quality Regulations March 1986
(6) New York State MCl's for Public Water Supply systems - proposed 1988
(7) New York State MCl's for Public Water Supply Systems - proposed: Based on total halogenated methanes criteria

EPA WORK ASSIGNMENT NO. 112-2L37.0
EPA CONTRACT NO. 68-01-7250

DRAFT
RESPONSIVENESS SUMMARY FOR THE MARATHON BATTERY COMPANY SITE VILLAGE OF COLD SPRING, NEW YORK

SEPTEMBER 1988

NOTICE

The information in this document has been funded by the United States Environmental Protection Agency (U.S.EPA) under REM III Contract No.68-01-7250 to Ebasco Services, Inc. (EBASCO). This document is a draft and has not been formally released by either Ebasco or EPA. As a draft, this document should not be cited or quoted, and is being circulated for comment only.

EBASCO SERVICES INCORPORATED EBASCO
160 Chubb Avenue, Lyndhurst, NJ 07071-3586, (201) 460-1900

September 26, 1988
RMOIII-88-314

Ms. Lillian Johnson
Community Relations Coordinator
U.S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, NY 10278

SUBJECT: REM III PROGRAM - EPA CONTRACT NO. 68-01-7250
WORK ASSIGNMENT NO.: 112-2L37.0
MARATHON BATTERY COMPANY SITE - AREA 2
DRAFT RESPONSIVENESS SUMMARY

Dear Ms. Johnson:

Ebasco Services Incorporated (EBASCO) is pleased to submit this draft Responsiveness Summary for the Marathon Battery Company site. If you have any comments, please call me at (201) 460-6434 or Carl Zoephel at (201) 906-2400.

Very truly yours,

Dev R. Sachdev

Dev R. Sachdev
REM III Region II Manager

cc: M. Shaheer Alvi
M.K. Yates
R.T. Fellman
M. Amdurer
J. McAdoo
N. Wilding

ACKNOWLEDGEMENT OF RECEIPT

Please acknowledge receipt of this enclosure on the duplicate copy of this letter and return the signed duplicate letter to: Dr. Dev Sachdev, Ebasco Services Incorporated, 160 Chubb Avenue, Lyndhurst, New Jersey 07071.

Ms. Lillian Johnson

Date

REM III PROGRAM

REMEDIAL PLANNING ACTIVITIES AT SELECTED UNCONTROLLED HAZARDOUS SUBSTANCE DISPOSAL SITES WITHIN EPA REGIONS I-IV

EPA WORK ASSIGNMENT NO. 112-2L37.0
EPA CONTRACT NO. 68-01-7250

DRAFT RESPONSIVENESS SUMMARY MARATHON BATTERY COMPANY SITE

VILLAGE OF COLD SPRING, NEW YORK

SEPTEMBER 1988

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MARATHON BATTERY COMPANY SITE
VILLAGE OF COLD SPRING
PUTNAM COUNTY, NEW YORK

DRAFT RESPONSIVENESS SUMMARY

The U.S. Environmental Protection Agency (EPA) held a public comment period from May 30, 1988 through July 6, 1988 for interested parties to comment on EPA's draft supplemental Remedial Investigation/Feasibility Study (RI/FS) and Proposed Remedial Action Plan (PRAP) for the Area II portion of the Marathon Battery Company Superfund site.

EPA held a public meeting on June 13, 1988 at the Cold Spring Fire Hall in Cold Spring, New York to describe the remedial alternatives and present EPA's and the New York State Department of Environmental Conservation's (NYSDEC's) preferred remedial alternatives for Area II of the Marathon Battery Company site.

A responsiveness summary is required for the purpose of providing EPA and the public with a summary of citizens' comments and concerns about the site, as raised during the public comment period, and EPA's responses to those concerns. All comments summarized in this document will be factored into EPA's final decision for selection of the remedial alternatives for cleanup of Area II of the Marathon Battery Company site.

I. **RESPONSIVENESS SUMMARY OVERVIEW.** This section briefly describes the background of the Marathon Battery Company site and outlines the proposed remedial alternatives for Area II of the Marathon Battery Company site.

II. **BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS.** This section provides a brief history of community interest and concerns regarding the Marathon Battery Company site.

III. **SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS.** This section summarizes both oral and written comments submitted to EPA at the public meeting and during the public comment period, and provides EPA's responses to these comments.

IV. **REMAINING CONCERNS.** This section discusses community concerns that EPA should be aware of as they prepare to undertake the remedial designs and remedial actions at the Marathon Battery Company site.

V. **APPENDICES.** This section contains written comments submitted to EPA and EPA's responses to the comments. The section is divided into the following appendices:

Appendix A: Letters to and from State and Federal Officials and EPA's responses.

Appendix B: Technical comments and questions and EPA's responses.

Appendix C: General comments and questions and EPA's responses.

I. RESPONSIVENESS SUMMARY OVERVIEW.

The Marathon Battery Company site, located in the Village of Cold Spring, Putnam County, New York, approximately 60 kilometers (km) north of New York City, includes a former nickel-cadmium battery manufacturing facility and surrounding plant grounds; the Hudson River in the vicinity of the Cold Spring pier, and a series of river backwater areas known as East and West Foundry Coves and Constitution Marsh.

In 1952, the U.S. Army Corps of Engineers (COE) constructed a battery manufacturing facility in the Village of Cold Spring, for the U.S. Army Signal Supply Agency.

In 1953, under contract with the Army Signal Corps, Sonotone Corporation began operating the plant to produce nickel-cadmium batteries for use in the NIKE Missile Program. Subsequent contracts for battery production at the plant included batteries for warhead failsafe systems and military jet fighters. Between 1954 and 1955, the contract was amended to permit Sonotone Corporation to produce commercial batteries.

In 1962, the government, having declared the property excess, sold it to Sonotone Corporation, who in 1967, became a wholly-owned subsidiary of Clevite Corporation. In 1969, Clevite Corporation merged with Gould, Incorporated who sold the plant to Business Fund, Incorporated, which later changed its name to Marathon Battery Company. Marathon Battery Company operated the plant until March 1979. The plant was inactive from March 1979 until November 1980, when it was sold to the current owner, Merchandise Dynamics, Incorporated, for use as a book storage facility. Merchandise Dynamics, Incorporated is presently bankrupt.

The plant's wastewater treatment system originally consisted of a lift station and piping for the transfer of all process wastewater into the Cold Spring sewer system for discharge directly into the Hudson River at the Cold Spring pier. In addition, a by-pass was installed so that when the lift station was shut down or overloaded the wastewater was discharged directly into East Foundry Cove Marsh.

In 1965, the New York State Department of Health (NYSDOH) identified the need for a sewage treatment plant in the Village of Cold Spring. During the design of the sewage treatment facility, the Village's consultant concluded that the battery plant's process effluent could not be managed by the proposed sewage treatment system. Subsequently, the Village of Cold Spring ordered Sonotone Corporation to disconnect its industrial discharge from the Village's sanitary sewer. To accomplish this directive, Sonotone shut down the pumps which discharged into the Hudson River through the Cold Spring municipal sewer system and by-passed the entire wastewater flow into East Foundry Cove. Sonotone then installed equipment which was designed to precipitate metal hydroxides and adjust the pH of the wastewater prior to discharge into the storm sewer system. However, this treatment system failed to operate properly. As a result, the treated wastewater failed to meet state discharge regulations, and the plant was given a deadline of January 1, 1970 to achieve compliance with these regulations.

In 1972, the U.S. Department of Justice filed a suit and then signed a Consent Agreement requiring the owners/operators to remove as much contamination from Foundry Cove as was economically, technically, and ecologically feasible. Hydraulic dredging was conducted between September 1972 and July 1973 and the dewatered dredge spoils were placed in a clay-lined underground vault on the plant property. The vault was then sealed with asphalt and fenced.

Various studies by New York University and others, were conducted on the Foundry Cove cadmium contamination problem prior to, during, and after the dredging activities. Post-dredging monitoring continued to detect elevated cadmium and nickel concentrations in the Cove's sediments, flora and fauna.

In October 1981, the Marathon Battery Company site was added to EPA's National Priorities List of hazardous waste sites.

In August 1983, EPA and the State of New York signed a cooperative agreement to undertake a remedial investigation and feasibility study (RI/FS) for the Marathon Battery Company site. ACRES International, NYSDEC's consultant, initiated the RI/FS covered by the cooperative agreement in May 1984.

An RI/FS report on the nature and extent of the contamination of the Foundry Cove/Hudson River portion of the site was completed in July 1985. Because the FS contained insufficient information to evaluate the technical merits and environmental effects of the remedial alternatives under consideration, additional RI/FS activities were necessary. Lead responsibility for the site was transferred to EPA and a supplemental RI/FS was completed by Ebasco (EPA's contractors) in August 1986.

In order to expedite the Superfund process, EPA has divided the site into three separate geographic areas: Area I, East Foundry Cove Marsh and Constitution Marsh; Area II, the former battery facility and surrounding grounds; and Area III, East Foundry Cove, West Foundry Cove, and the Hudson River in the vicinity of the Cold Spring pier.

On September 30, 1986, EPA signed a Record of Decision (ROD), selecting a remedy for Area I. Selection of the cleanup option was based on previous studies, site investigations by Ebasco, and comments received from the public.

The selected clean-up activities include:

- Dredging of contaminated sediment from East Foundry Cove Marsh;
- Sediment thickening, chemical fixation and off-site disposal in a sanitary landfill;
- Replacement of the excavated sediment with clay and clean fill followed by revegetation of the marsh; and
- Long term monitoring of heavy-metal concentrations at Constitution Marsh (since it is believed that dredging of Constitution Marsh would cause extensive environmental degradation to the marsh, the No-Action alternative was selected).

Field activities for Area II were initiated in late 1986 and were completed in March 1988. These activities include: the collection of soil and groundwater samples from the plant grounds and wipe samples and floor borings from inside the former battery facility.

Field activities for Area III were initiated in late 1986 and include the collection of soil sediments, water, and fish tissue sampling from West Foundry Cove, and the Hudson River in the vicinity of the Village of Cold Spring pier. Samples will be analyzed for cadmium, cobalt, and nickel content.

Twenty remedial alternatives were identified in the Area II Feasibility Study to address the contaminated groundwater and soil from the former battery facility, and the dredge spoils vault. Of these, eleven alternatives were considered for detailed evaluation. These include:

Groundwater

Alternative GW-1: No Action

This alternative includes use of existing monitoring wells to conduct a long-term groundwater monitoring program which would monitor the concentrations of contaminants of concern (i.e., trichloroethylene, tetrachloroethylene, 1,1,1, - trichloroethane, 1,2 - dichloroethane and chloroform) in the aquifer underlying the former battery plant grounds. In addition, the development of the aquifer for potable and municipal water uses would be restricted through institutional controls. The monitoring program would include placement of additional monitoring wells screened into the bedrock.

Alternative GW-3: Pumping/Carbon Adsorption/On-Site Discharge

Under this alternative a well system consisting of 4 extraction wells would be installed to withdraw contaminated groundwater for on-site treatment by carbon adsorption. The treated groundwater would be discharged to East Foundry Cove.

Alternative GW-4: Pumping/H_2O_2-UV Oxidation/On-Site Discharge

This alternative consists of pumping, collecting, and treating contaminated groundwater. The contaminated groundwater would be mixed with a 50% hydrogen peroxide solution and then pumped into an oxidation chamber. UV light would be used to accelerate the oxidation process. The contaminants in the water would be oxidized to CO_2, H_2 and halides and the clean water would then be discharged to East Foundry Cove.

Soil/Battery Facility

Alternative S-1: No Action

For this "no-action" alternative, the following activity would be implemented to restrict the public access to the former battery plant grounds:

- Continue enclosing the former battery plant grounds by using the existing property fence. Warning signs would be attached to the fence.

In addition, a long-term monitoring program would be conducted to check groundwater quality and migration of metal contaminated soil due to erosion.

Alternative S-2: Building Decontamination/Off-Site Disposal/Soil Capping

The metal contaminated dust on the inside surfaces of the building (e.g. walls, ceilings, floors, etc.) and on the surfaces of the stacked books would be decontaminated using a dusting, vacuuming and wiping procedure. The collected dust would then be transported by truck to an off-site RCRA Landfill. The contaminated ground surface would be compacted, graded and capped with macadam.

Alternative S-3: Building Decontamination/Soil Excavation/Fixation/Enhanced Volatilization/On-Site Disposal

In this remedial alternative, the building decontamination would be carried out in the same manner as that of Alternative S-2. However, the collected dust would be treated along with the metal contaminated soil as described in the following.

The excavated metal contaminated soil and dust would be bound and/or physically encapsulated into a product material (fixated) and the contaminants would no longer be able to leach out. The fixated material would no longer be hazardous and would be disposed of on-site in a pit located in the southwest section of the former battery plant grounds. The volatile organic contaminated soil would be subjected to enhanced volatilization.

Alternative S-4: Building Decontamination/Soil Excavation/Fixation/Enhanced Volatilization/Off-Site Disposal

This remedial alternative is the same as Alternative S-3 except that the fixated material would be trucked to an off-site disposal facility. The "cleaned" organic contaminated soil (after enhanced volatilization) along with additional clean soil, would be brought in, and be used to backfill the excavated areas. These areas would be covered with top soil and reseeded to establish a grass surface.

Dredge Spoils Vault

Alternative V-1: No Action

This remedial alternative would leave the vault in its existing condition. The Remedial Investigation results indicate that no contaminant metals (Cd, Co, and Ni) have been leached out to contaminate the groundwater underlying the former battery plant grounds, and that the vault is intact. The metal contaminated sediment in the vault was mixed with 0.5% (by volume) of powdered limestone (to keep the metals insoluble in water to prevent leaching). The vault has been fenced to restrict public access.

A long-term groundwater monitoring program and periodic inspection of the vault capping would be included in this alternative in order to check the integrity of the vault. This program would also involve maintenance of vegetation on top of the vault.

Alternative V-2: Excavation/Fixation/On-Site Disposal

In this remedial alternative, the operations involved in excavating, fixating and disposing of the 5,000 yd^3 of contaminated sediments in the vault are the same as those used for the soil removal in Alternative S-3. The chemically fixated sediment would be disposed of in the disposal pit developed by enlarging the existing vault. A larger disposal area would be needed because the fixated materials volume could be as twice as much as the volume of the contaminated sediment. The disposal pit would be covered with topsoil and reseeded.

Alternative V-3: Excavation/Fixation/Off-Site Disposal

In this remedial alternative, the operations involved in excavating, fixating and disposing of the 5,000 yd^3 of sediment in the vault are the same as those used for the contaminated soil in Alternative S-4. The excavated vault would be backfilled with clean soil, covered with top soil and reseeded to establish a grass surface.

Alternative V-6: Sediment Excavation/Off-Site Treatment and Disposal

This alternative includes excavation of the sediments in the vault, and transportation of the excavated sediment to an off-site RCRA treatment and disposal facility.

Selection of an Alternative

EPA's selection for remediation at the Marathon Battery Company site is based on the requirements of CERCLA and SARA. These laws require that a selected site remedy be protective of human health and the environment, cost-effective, and in accordance with other statutory requirements. Current EPA policy also emphasizes permanent solutions incorporating on-site remediation of hazardous waste contamination whenever possible. After consideration of all available design documents for the vault, it is the agency's decision that removal of the vault (Alternative V-3) would provide a higher degree of protection to human health and the environment than the no-action alternative recommended in the PRAP.

II. BACKGROUND ON COMMUNITY INVOLVEMENT AND CONCERNS

The Marathon Battery Company site emerged as a major community issue in Cold Spring when EPA and NYSDEC signed a cooperative agreement in September 1983 to undertake an investigation of the site. EPA and NYSDEC have both been actively involved with the public participation program at the site. The agencies have held several public meetings, numerous informal meetings, and public availability sessions, as well as meetings with the local officials. The community has been very involved with the Marathon Battery Company site and there are a number of organizations that have also expressed concerns about the site. These organizations include: the National Audubon Society; Scenic Hudson and the Clearwater, two Hudson River-based environmental groups; the Preservation and Revitalization of the Cold Spring Area (PROCO); the Hudson River Fisherman's Association; and the Concerned Citizens About Removing Toxins (CCART).

The major concerns expressed by the community over the last few years are listed below.

- Health Risk Associated with the Plant Facility. Results of the RI indicate that there has been no migration of contaminants from the vault. Areas of contamination have been found however, on the facility property, in the facility building, and in adjacent residential yards. Although this is an issue of genuine concern for the residents of Constitution Drive, they are equally, if not more, concerned with the pile of debris that has accumulated in the yard on the facility property.

- Health Risks Associated with Eating Local Marine Life. Blue claw crabs are harvested in the lower Hudson River basin, and are a regular part of the diet of many residents. Studies have shown that crabs and other marine life in the Cold Spring area contain high levels of cadmium.

- User and Property Issues. The West Foundry Cove is also a hub for recreational boating in the area. The Cold Spring Boat Club and some business people in the community would like to upgrade the existing waterfront facilities and further develop waterfront property. These plans have been suspended until the remedial action at the Area III portions of the Marathon Battery Company site takes place. These members of the community have a strong desire to see the remedial action decided upon and completed. Moreover, although property values have risen dramatically in recent years, there is a fear that eventually property values will be hurt by prolonging the remedial action.

- Water Source for the Fire Department. The Village of Cold Spring has expressed a need for an additional water supply for its fire department. There are two logical and readily available options: the water well at the former Marathon Battery Company plant and the Hudson River near the Cold Spring Pier. Access to both sources has been denied, however, until the completion of remedial action. Access is restricted due to the contaminated sediments in the Hudson River and the volatile organics in the groundwater.

- Hudson River Contamination. The overall cleanliness of the Hudson River is a major concern to both the local community and a number of national and regional environmental groups. Groups such as the Clearwater and Scenic Hudson have been actively involved in all phases of the work conducted to date at the site, and can be expected to remain active throughout the entire remedial action.

- Railroad Easement. The Metropolitan Transportation Authority Railroad, one of the major rail connections between New York City and Albany, is the dividing line between East and West Foundry Cove. The railroad is supported by pilings in the channel. The railroad authority wants to be assured that any remedial action will not damage the existing structure.

- Issues Concerning Remedial Action. Local residents feel that much money has been spent with no tangible results. They feel that there is no developed plan of action and that they have yet to be given any real guarantee that the site will be cleaned up. The ROD signed for Area I has somewhat mitigated this concern. The ROD selected a remedy for Area I, and that remedy is currently under design.

  An additional concern that has recently been expressed to EPA is the potential hazard of a fire in the former battery building. The building is used to store books and the sprinkler system in the building is currently inoperative. The potential exists that a fire could result in a significant release of hazardous waste to the environment. To address this concern, EPA is considering repairing the sprinkler system and the currently inoperable heating system (to prevent freezing of the sprinkler system pipes in the winter).

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA RESPONSES TO THESE COMMENTS

Comments raised at the public meeting held on June 13, 1988 are summarized below and are organized into the following categories:

A. Alternatives GW-1, No-Action; S-4, Building Decontamination/Soil Excavation/Fixation/Enhanced Volatilization/Off-Site Disposal; and V-1, No Action;

B. Dredge spoils vault;

C. Cost of remediation, and

D. Other site-related concerns.

Written comments submitted to EPA during the public comment period, along with EPA's responses to those comments are attached as Section V.

A. ALTERNATIVES GW-1, S-4 AND V-1

1. **Comment:** Several residents asked how long and how frequently EPA would continue to monitor the groundwater and the dredge spoils vault (if it were left on-site).

   EPA Response: After one year, NYSDEC would be responsible for monitoring the groundwater underlying the site for a 30 year period. However, this period is primarily for the purpose of determining the costs of the alternatives. The monitoring would continue for as long as necessary if the vault is retained. NYSDEC would check the surface condition of the dredge spoils vault annually.

2. **Comment:** A resident asked for clarification as to which government agency would be responsible for the monitoring program at the site.

   EPA Response: EPA and NYSDEC will sign an agreement that will assign responsibility for monitoring the Marathon Battery Company site to NYSDEC.

3. **Comment:** Several residents requested information about the potential increase in the amount of truck traffic that could result from the off-site disposal of the fixated metal-contaminated soil and dust. They also asked if a route had been determined for the increased truck traffic.

   EPA Response: The method of transporting material off-site has not yet been decided, and will be examined in detail during the remedial design. EPA is investigating the possibility of transporting the material by railroad freight cars as was suggested at a previous public meeting. If trucks are used for transportation, approximately 40 trucks per day for seven months would be needed to remove material from Area I, and 12 truckloads per day for two to three months would be required to remove the material in Area II. If the use of trucks is determined to be the method of transportation, the design engineers will determine and propose a route that would be least disturbing to area residents to the maximum extent possible.

4. **Comment:** Two residents asked about the disposal location for the fixated metal-contaminated soil and dust.

   EPA Response: NYSDEC will designate a disposal site during the remedial design phase of the project.

5. **Comment:** A resident asked if EPA would consider vitrification technology to remediate the site if a disposal site could not be identified.

EPA Response: EPA has already evaluated vitrification as an alternative, and has determined that vitrification would essentially transform the entire area into a glass-like product, and would not achieve a higher level of public health protection than the fixation process proposed by EPA.

6. **Comment:** Several residents wanted to know the role of NYSDEC in the selection of a remedial alternative for the site.

EPA Response: EPA and NYSDEC have worked together on the investigation of the site, jointly reviewing all documents, data, etc. While the selection of a remedy for this site is the responsibility of EPA's Regional Administrator, NYSDEC's concurrence with the remedy is desired.

B. DREDGE SPOILS VAULT

1. **Comment:** Several questions were asked regarding the laboratory detection limits used by EPA in analyzing the cadmium levels in the groundwater in the vicinity of the dredge spoils vault and the detection limits suggested by NYSDEC.

EPA Response: The analyses performed on the groundwater used the lowest detection values capable of by the laboratory. The cadmium detection limits ranged in value from 0.7 micrograms per liter to 5 micrograms per liter. All readings of cadmium detected in the groundwater were recorded in the Remedial Investigation report. NYSDEC's current lower detection limit for cadmium in groundwater is 0.5 micrograms per liter. The difference between the lower detection limits is insignificant, and EPA is confident that the analyses conducted would have detected any contaminants leaching from the vault into the groundwater.

2. **Comment:** A resident asked if the laboratories conducting the analyses were EPA labs, or if EPA contracted lab work to the lowest bidder.

EPA Response: The labs are not EPA labs. Contract laboratories are selected on their ability to properly analyze samples.

3. **Comment:** Several individuals asked about the life expectancy of the dredge spoils vault.

EPA Response: According to Dr. Harry Gregor, the designer of the vault, it is designed to last indefinitely. In general, however, containment facilities are usually designed for 30 years.

4. **Comment:** Several residents asked why EPA did not plan to remove the dredge spoils vault during site remediation, when manpower and equipment would be at the site removing the fixated metal-contaminated soil and dust. They also asked what course of action EPA would pursue if the vault started to leak.

   EPA Response: After consideration of all available information regarding the vault, it is the agency's conclusion that removal of the vault is a more appropriate solution for this portion of the site in assuring a higher level of confidence in the long-term effectiveness and permanence of the remedy, than the no-action alternative.

C. COST OF REMEDIATION

1. **Comment:** A resident asked if the potentially responsible parties (PRPs) had been identified at the Marathon Battery Company site, and if any municipalities had been named as a PRP.

   EPA Response: The PRPs have been identified and will be pursued through legal channels to accept responsibility for remediation of the site. At this time no municipalities have been named as PRPs.

2. **Comment:** A resident asked who would be responsible for absorbing the cost of cleaning up the site at the present time.

   EPA Response: If the PRPs do not offer to undertake the work, EPA will use Superfund monies to pay for 90 percent of the cleanup costs. NYSDEC will provide the remaining 10 percent.

3. **Comment:** A local official wanted to know why EPA evaluated cost as a criteria for selecting a remedial alternative, rather than selecting the most effective remedy for the site.

   EPA Response: There are nine criteria that EPA must evaluate during the selection of a remedial alternative. These include: short-term effectiveness, long-term effectiveness and performance, reduction of toxicity mobility or volume, implementability, cost, compliance with applicable, relevant and appropriate requirements (ARARs), overall protection of human health and the environment, state acceptance, and community acceptance. It is a statutory requirement to select the cost effective remedy. The objective is to select the most cost-effective, environmentally sound remedy.

4. **Comment:** A resident questioned whether funds would be available in the future for removal of the vault, if the vault were to be left in-place.

   EPA Response: EPA anticipates that the Superfund program will be reauthorized, making funds available for remediation of the vault, if the vault were to be left in-place.

D. OTHER SITE RELATED CONCERNS

1. **Comment:** A local official requested information on the procedures that EPA would use to clean up the East Foundry Cove Marsh in Area I.

   EPA Response: Following dredging of the contaminated sediments, the sediments will be chemically fixated to stabilize the metal contaminants. The fixated material will then be transported off-site for disposal. Following this process, the excavated sediment will be replaced with clay and clean fill and the marsh area will be revegetated.

2. **Comment:** A local official asked EPA about the anticipated time period for EPA to conduct their activities within the three separate areas at the Marathon Battery site.

   EPA Response: A Record of Decision (ROD) for Area I was signed by EPA in September 1986, and the remedial design for that area should be completed by Spring 1989. The remedial design for Area II is expected to be completed in approximately one year, or the Summer of 1989. Following completion of the design phases, the actual remedial actions for Areas I and II can be implemented. The investigation of Area III was initiated in late 1986 and EPA is anticipating a ROD for that area in the Spring of 1989.

3. **Comment:** A resident asked how the groundwater in the Marathon Battery site area became contaminated with volatile organics.

   EPA Response: Volatile organic contaminants from contaminated soils on the site leached down into the groundwater and migrated off site.

4. **Comment:** A resident inquired about the results of soil samples taken in neighborhood backyards.

   EPA Response: EPA took 23 surface soil samples in residents' yards. Cadmium levels ranged from 4.0 to 67.0 parts per million (ppm), with a mean of 17.1 ppm. During the design phase of the project, EPA will collect additional samples to determine the extent of contamination that may be present on private properties, which will require remediation.

5. **Comment:** Several residents asked if EPA assumed responsibility for the former battery facility building, and questioned why the building was allowed to be used as a book storage facility.

   EPA Response: The facility was purchased by Merchandise Dynamics in 1980 for utilization as a book repository before the site became a Superfund site. When samples were collected in the facility, which indicated that high levels of contamination were present, EPA indicated to the owner that the books present in the facility would require decontamination prior to removal. The former battery facility is private property. EPA must have permission from the property owners in order to enter the property. If this situation becomes difficult at some point, EPA can obtain legal authority to enter the property and conduct any necessary activities.

6. **Comment:** Several local firemen expressed concern over the possibility of a potential release of hazardous substances occurring in the event of an on-site fire.

   EPA Response: Contaminants on the building grounds and the building will be removed as part of the remediation of the site. In the interim, EPA is proposing to repair the sprinkler system in the former battery facility building and repair the building heating system to ensure that the sprinkler pipes do not freeze in the winter.

7. **Comment:** A resident asked about the physical condition of the site grounds and the former battery facility building following remediation.

   EPA Response: The excavated areas will be backfilled with treated soil and clean fill. Following remediation, the building and grounds can be used for any suitable industrial purpose. The former battery facility itself, and the adjacent yards will be cleaned up to a level of 20 ppm.

IV. REMAINING CONCERNS

Concerns raised at the public meeting by the community about remedial activities at the Marathon Battery Company site will continue to be important community issues. The primary reason for the continuing high level of community interest is because the site is broken up into three distinct areas, or operable units, and identical issues resurface during the RI/FS process for each area.

One area of concern that may significantly increase during remedial activities is the potential for the detection of cadmium-contaminated soil in the yards of private residences. Area residents should be kept fully informed of sampling activities and results throughout the investigation in order to dispel public health concerns.

SECTION V. APPENDICES

APPENDIX A

cc: Marshall
Randol
Luftig/Act

response
due
8/12/8

RA
Signa

THE SENATE
STATE OF NEW YORK

MARY B. GOODHUE
SENATOR 37th DISTRICT
CHAIRMAN
COMMITTEE ON CHILD CARE
VICE-CHAIRMAN
LEGISLATIVE COMMISSION ON THE
MODERNIZATION AND SIMPLIFICATION
OF TAX ADMINISTRATION AND TAX LAW

PLEASE REPLY TO
☐ ROOM 803, LOB
ALBANY, NEW YORK 12247
518-455-3111
☒ DISTRICT OFFICE
226 EAST MAIN STREET
MT KISCO, NEW YORK 10549
914-241-2541

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AGING
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INVESTIGATIONS, TAXATION AND
GOVERNMENT OPERATIONS
JUDICIARY
MENTAL HYGIENE AND
ADDICTION CONTROL

August 5, 1988

Magalie Beausejour, Project Manager
U.S. Environmental Protection Agency
Emergency and Remedial Response Division
26 Federal Plaza, Room 23-102
New York, NY 10278

Dear Ms. Beausejour:

Re: Marathon Battery Site
Cold Spring, New York

As the State Senator who represents the Village of Cold Spring, N.Y., I am writing to echo the opinion of those who fear that the EPA's Proposed Remedial Action Plan (JUNE 1988) for the above site is not adequate to protect the health and safety of local residents. My office has been flooded with letters and petitions from residents who disagree with the plan, which has the endorsement of NYS DEC, particularly the assessment of 'No Action' concerning the dredge spoils vault on the site. I must say I find it incomprehensible that on the one hand the area could be on a federal list of contaminated properties needing attention, and on the other hand that no action is recommended for a vital portion of the contaminated area.

Neither residents nor other elected officials are at ease with the EPA and NYS DEC contention that a clay-lined vault in an asphalt pit is adequate to prevent the leaching of toxic materials from the dredge spoils. It seems contradictory that the NYS DEC has recently determined that municipal landfills will need to include double layers of clay and synthetic liners as well as systems for the collection of leachate, yet it will allow the toxic materials at the Marathon Battery Site to remain in a clay-lined vault built 15 years ago.

In terms of the 'No Action' decision on groundwater, the Proposed Remedial Action Plan states, "It is assumed [my underline] that long-term groundwater monitoring will comply with New York hazardous waste management system groundwater monitoring requirements." This issue is too important to be left to an assumption. What steps will be taken to ensure that long-term monitoring is accomplished and that results of this testing will comply with appropriate standards?

Residents are understandably upset with reports of cadmium contamination in soil samples taken from their backyards. If this is the case, why have no health advisories been issued and why does the Proposed Remedial Action Plan not address this issue? Are there any plans, either by the EPA or by NYS DEC to study long-term effects of this contamination?

These are merely some of the concerns the community shares about the contaminants which pose a threat to the environment and to the health of local citizens. The June 1988 publication states that no public comments have been received. Since that writing, a meeting took place on June 13, 1988 in which public opinion was sought. In light of input from the community and elected officials, have any portions of the action plan been altered?

Before the Record of Decision is submitted, I request that the EPA: 1) change the Proposed Remedial Action Plan to clean up the site and properly dispose of these toxic materials; and 2) conduct a more comprehensive study on the presence of cadmium and other contaminants in local backyards and that results of this study be made known to area residents.

I appreciate your attention to this matter of vital importance, and I am anxiously awaiting your response to my requests.

Very truly yours,

Mary B. Goodhue
Senator, 37th District

cc: Thomas C. Jorling
Commissioner, NYS DEC

MBG/sd

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK NEW YORK 10278

AUG 3 0 1988

Honorable Mary B. Goodhue
New York State Senator
226 East Main Street
Mt. Kisco, NY 10549

Dear Senator Goodhue:

This is in response to your August 5, 1988 letter regarding the Marathon Battery Company Superfund site, located in Cold Spring, New York.

The Marathon Battery Company site includes a former nickel-cadmium battery manufacturing facility, the Hudson River in the vicinity of the Cold Spring pier, and a series of river backwater areas known as East Foundry Cove, West Foundry Cove, and Constitution Marsh.

You express concern in your letter over the adequacy of a "clay-lined vault in an asphalt pit" to prevent the leaching of cadmium from the sediments that were dredged from Foundry Cove in the early 1970s. You should note, however, that the Environmental Protection Agency's (EPA's) proposed remedy weighed many technical considerations regarding the construction of the vault and the potential for cadmium to migrate off-site. We noted that the vault was constructed of one foot of clay on the sides and bottom, and six inches on the top. Also, the entire structure, which is located approximately ten feet above the water table, and below the frost line, is enclosed in two inches of asphalt. In addition, a gas ventilation system was installed to vent any gases that are generated as a result of microbial degradation of organic material in the sediments. While this structure is not, as you noted, a state-of-the-art containment facility by today's standards, based upon our sampling results, it appears to be containing the sediments.

While the vault appears to be an adequate on-site containment system, EPA is evaluating all public comments concerning the proposed remedy and, in particular, the long-term maintenance requirements and level of protection provided by the vault. All evaluation criteria, such as community acceptance and permanence, will be considered further before EPA selects a remedy for this portion of the site.

To answer your question pertaining to monitoring of the groundwater, EPA and the New York State Department of Environmental Conservation will enter into a formal agreement in which the State will guarantee the performance of future monitoring. Appropriate federal and state groundwater standards will be utilized for this sampling program.

In the past, EPA collected soil samples from the residential yards adjacent to the former battery facility to determine whether off-site migration of heavy metal contamination from the site had occurred, and whether it posed an immediate health threat to the residents. As noted in your letter, release of the data was inadvertently delayed. These data, which indicate no immediate health threat, were discussed with area residents at a June 13, 1988 public meeting. Following the public meeting, the data and an explanation of it were forwarded to the residents whose yards were sampled.

In your letter, you suggest that additional sampling of the residential yards be performed. As part of the remedial design, intensive sampling of the adjacent residential yards will be performed to determine the extent of the soils requiring remediation.

Should you have any questions, please contact me, or have your staff contact Jeane Rosianski of the Office of External Programs at (212) 264-7834.

Sincerely,

William J. Muszynski, P.E.
Acting Regional Administrator

cc: Thomas C. Jorling, Commissioner
New York State Department of
Environmental Conservation

bcc: Alice Green, A-101

ALFONSE M. D'AMATO
NEW YORK

United States Senate
WASHINGTON, DC 20510

TO: EPA Region II
26 Federal Plaza
New York, N.Y. 10007

FROM: Alfonse M. D'Amato
United States Senator

Because of the desire of this office to be responsive to all inquiries and communications, your consideration of the attached is requested.

PLEASE TRY TO RESPOND WITHIN 4 WEEKS OF YOUR RECEIPT OF THIS REQUEST. YOUR FINDINGS AND VIEWS, IN DUPLICATE, ALONG WITH THE RETURN OF THIS MEMO, WILL BE APPRECIATED.

SEND ALL CORRESPONDENCE ON THIS MATTER DIRECTLY TO MY NEW YORK CITY OFFICE, SEVEN PENN PLAZA, SEVENTH AVENUE, SUITE 600, NEW YORK, NEW YORK, 10001.

Thank you.

AD:mmp

20 Constitution Drive
Cold Spring, N.Y. 10516
July 3,1988

The Honorable Alphonse D'Amato
1 Penn Plaza
New York, N. Y. 10001

Dear Sir:

The Marathon Battery site in Cold Spring-on-Hudson, N.Y. is rated number 6 on the Superfund list of hazardous sites scheduled for clean-up. On June 13, 1988, the residents of Philipstown met with representatives of the EPA in a public forum for discussion of the most recent findings of the ongoing study of the site.

1988 JUL -7 PM 3 36

At this meeting, the results of testing done on the factory site itself were detailed and the Proposed Remedial Action Plan was released for public comment. The plan of action is to be finalized in the spring of 1989.

At this time, we, the residents of Constitution Drive, which is adjacent to the contaminated property, are seeking your assistance in our request to the EPA to speed up the investigation. We have been waiting for answers since the winter of 1984. If this site is as dangerous as we have been led to believe, why has the urgency to protect public health been neglected by the EPA dragging out this investigation for years?

We were unofficially told at the June 13 meeting that there is a high contamination level of cadmium in several backyards along Constitution Drive. We are outraged by the lack of communication from the EPA and feel it is about time we were given facts without waiting for a public meeting.

The Village of Cold Spring and surrounding Philipstown residents have signed a petition requesting that the EPA reconsider the decision of "No Action" involving the vault which contains cadmium dredged from the Hudson River in 1974. We feel the vault should not be left on the property for future monitoring because the past 15 years have shown no monitoring systems and total neglect of the property above the vault.

1988 JUL 26 PM 3 40

We have been patient for four years but have had it and beg your influence on our behalf to get the Superfund working for the good of the people.

Please help!

Sincerely yours,

Constitution Drive Residents

C.C.A.R.T.

Concerned Citizens About Removing Toxins
20 Constitution Drive
Cold Spring, NY 10516

July 5, 1988

Magalie Beausejour, Project Manager
U.S. Environmental Protection Agency
Emergency and Remedial Response Division
26 Federal Plaza, Room 23-102
New York, New York 10278

Dear Ms. Beausejour:

We are writing to you to comment concerning the EPA proposed remedial action plan for the Marathon Battery site.

We do not agree with any of the EPA's choices regarding the dredge vault as remedy to the site.

We disagree with alternative V-1, no action, for a number of reasons. It appears the decision is based solely on price and not on the effects of the vault becoming compromised. In the 15 years since the vault was constructed, there has been absolutely no maintenance save for one grass cutting. There is no reason to believe that this will change. Asphalt and clay are not impervious to root and vegetation damage. Damage may already be done to the vault since it has been 21 months since its last inspection. Posting of signs and installing fences are not a guarantee of safety. The signs which were erected in the cove and marsh area are illegible after less than 24 months and fences are no longer a deterrent to vandalism.

The danger to health for the Cold Spring area and surrounding communities such as Beacon, Garrison, and the entire Philipstown area as a whole will not be lessened by no action.

We, the citizens on the attached petitions, demand that the EPA adopt option V-6 as the preferred option for the dredge spoils vault.

NO LONGER WILLING TO WAIT FOR ANSWERS,

C.C.A.R.T.

cc: Alphonse D'Amato
Daniel P. Moynihan
Hamilton Fish
Mary C. Goodhue
George Pataki
Peter C. Alexanderson

AUG 23 1988

Honorable Alfonse D'Amato
United States Senator
Seven Penn Plaza, Suite 600
Seventh Avenue
New York, New York 10001

Dear Senator D'Amato:

This is a follow-up to my August 9, 1988 letter regarding the Marathon Battery Company Superfund site, located in Cold Spring, New York.

The Marathon Battery Company site includes a former nickel-cadmium battery manufacturing facility, the Hudson River in the vicinity of the Cold Spring pier, and a series of river backwater areas known as East Foundry Cove, West Foundry Cove, and Constitution Marsh. There are presently 799 Superfund sites on the National Priorities List (NPL); the Marathon Battery Company site is ranked number 715.

In your letter, you indicate that your constituents have complained about the extensive delay in remediating the site. Admittedly, the ongoing investigation of this site has taken a number of years to perform. But because the affected area is over 400 acres, and because of the bioaccumulative nature of cadmium, the primary contaminant of concern at this site, the ongoing investigation has been a very complex and time-consuming undertaking. To determine the full extent of contamination present, and what threat this contamination poses to public health and the environment, over 1,200 biota, surface water, sediment, groundwater, dust, air, and soil samples have been collected, analyzed, and evaluated since the field work commenced in the spring of 1984. Our consultant has also performed extensive laboratory testing to evaluate various treatment alternatives for addressing the heavy metal contamination present in the East Foundry Cove sediments and on- and off-site soils. In addition, two remedial investigation/feasibility study (RI/FS) reports have been prepared to define the nature and extent of the contamination and to identify and evaluate remedial alternatives for two portions of the site.

Based upon the results of the first RI/FS, in September 1986, the Environmental Protection Agency (EPA) selected a remedy for the East Foundry Cove Marsh/Constitution Marsh portion of the site. This remedy, which involves removal of the contaminated sediments, followed by chemical fixation and off-site disposal, is currently under design. It is anticipated that this design will be completed in the spring of 1989.

The second RI/FS, pertaining to the former battery facility portion of the site, was the subject of a June 13, 1988 public meeting in Cold Spring. At this public meeting, my staff discussed the preferred remedy, which was identified as decontamination of the former battery facility, excavation and chemical fixation of the heavy metal-contaminated soils on the former battery facility grounds and adjacent residential yards, excavation and thermal treatment of on-site soils contaminated with volatile organics, and continued monitoring of the groundwater and a dredge spoils vault containing cadmium-contaminated sediments dredged from East Foundry Cove in the early 1970s. The preference for no action other than long-term monitoring of dredge spoils vault was not based upon cost alone, as was concluded by the Concerned Citizens About Removing Toxins. No action for the vault was suggested because, based upon EPA's evaluation of the results from the groundwater monitoring wells installed around the vault, which showed no detectable levels of cadmium, as well as an evaluation of the vault's design plans and specifications, the vault appears to be constructed in such a manner so as to prevent the release of the contaminated sediments to the environment.

While the vault appears to be an effective containment system, and leaving it in-place does not appear to pose an immediate threat to public health or the environment, other evaluation criteria, such as community acceptance and permanence, will be considered further before EPA selects a remedy for this portion of the site.

In the past, EPA collected soil samples from residential yards adjacent to the former battery facility to determine whether off-site migration of heavy metal contamination from the site had occurred, and whether it posed an immediate health threat to the residents. As noted in your letter, release of the data was inadvertently delayed. These data, which indicate no immediate health threat, were discussed with area residents at the June 13, 1988 public meeting. Following the public meeting, the data and an explanation of it were forwarded to the residents whose yards had been sampled.

Should you have any questions, please contact me, or have your staff contact Jeane Rosianski of my staff at (212) 264-7834.

Sincerely,

William J. Muszynski

William J. Muszynski, P.E.
Acting Regional Administrator

cc: Thomas C. Jorling, Commissioner
New York State Department of
Environmental Conservation

bcc: Alice Greene, A-101

DANIEL P. MOYNIHAN
NEW YORK

UNITED STATES SENATE

Date: JUL 19 1988

Respectfully referred to:
U.S Environmental Protection Agency

for such consideration as the enclosed may warrant. Please send me your written response in duplicate along with the letter from my constituent.

Sincerely,

United States Senate

Mark to the attention of: Ms. Tiza D. Tjokroadisumarto

Office of Senator
Daniel P. Moynihan
733 Third Avenue
New York, NY 10017

(212) 661-5150

EPA-REGION II
OFFICE OF EMERGENCY &
REMEDIAL RESPONSE
1988 JUL 25 [illegible]
[illegible]

4 Depot Square
Cold Spring, New York
July 9, 1988 10516

Daniel Patrick Moynihan
733 Third Ave
New York, New York

Dear Senator Moynihan,

I live in a small village called Cold Spring New York, about 60 miles north of New York City. We are located in the dramatic heart of the Hudson Valley. Many people come here to visit and enjoy the spectacular scenery, beautiful surroundings and learn about the historical legends that have followed us for centuries.

Cold Spring is noted as being one of New Yorks Historical landmarks. This preservation is a vital and integral part of maintaining our existence with an optomistic future. It is the examination of the quality of life in our environment that will be an ongoing effort to strive for a successful future for ourselves and our children.

I am writing to you about some major concerns that have to do with environmental hazards and risks to Public Health safety within our community and surrounding areas. There have been alot of instances during the past 30 years which have not been brought to public attention. Many people have been exposed to unacceptable levels of cadmium toxins. Some of these toxins have been found in soil samples taken from the yards of family homes on Constitution Drive, Cold Spring and extremely high levels in the vicinity of Foundry Cove, and Constitution Marsh Sanctuary on the Hudson River. Along the shores of the Hudson has been established some of Americas most earliest history. We have come so far as to destroy one of our most plentiful natural resources.

On June 13th 1988 I attended a horrifying meeting with theEPA and citizens of Cold Spring and Philipstown concerning the Sonotone Marathon Battery Co. Site. Enclosed you will find some information about the heavy contaminant levels of toxins which are encapsuled in a so called vault made of clay and asphalt, buried in the ground just a short distance from family homes on Constitution Drive here in Cold Spring. We have not only contaminated our River but also a large surface area in the midst of our community.

I assume the vault was put there as a remedy back in 1973 during the dredging period of Foundry Cove. It has posed an on going threat over all of these years especially during the dredging period when these contaminants were placed on the parking lot grounds of the Marathon plant where they were left to dry out for 2 months before actual placement in the vault in 1973. Innocent people have witnessed and been exposed to these toxins in the past with no mention of the extreme dangers involved. As you know you have recieved copies of the pettition signed by 100's of area residents who demand removal of this haphazard commodity called the vault which contains 5,000 cubic yards of toxic cadmium sediment. Too many events of inferior quality have become mistakes with high risks involved. Cadmium poisoning is known to be a human carcinogenic either in high concentrations for short periods of time and in low doses for long periods of time. * Scientists believe the health hazards associcted with long term low level exposure in the environment may be the more serious of the two.

Now in 1988 the Marathon Co. Site sits unattended, improperly monitored, and is a site which has not been maintained for almost 10 years. This heavily overgrown area has also become a very serious fire threat that which we have just most recently become aware. Considering the EPA has finally decided to inform us of this danger.

I am beginning to believe that the EPA itself needs monitoring. How can they be trusted when they let a severe problem such as this get out of hand? We are listed among the top ten most hazardous sites in the nation ,number 6 on the Superfund List. In the past we have not been adequately informed as to the dangers around us.

In recieving articles submitted by the EPA their informative updates have been crirically behind, and thouroughly lacking in expertise as to the proposed remedial measures suggested. Any measures taken are detrimental for the Public Health and Safety of individuals in our community.

A small group of Cold Spring residents have formed and organization called C.C.A.R.T. " Concerned Citizens Actions to Remove Toxins ". WE wish to cooperate with the proper channels involved in maintaining future Public Health Safety and to rid our environment of highly unacceptable levels of cadmium toxins found in Foundry Cove, The Hudson River, Constitution Marsh Sanctuary and also the backyards of family homes on Constitution Drive.

We are in desperate need of your support to respond on behalf of our well being. Thank you very much for your consideration.

Sincerly,

Antonia Garufi

Antonia Garufi
Secretary for C.C.A.R.T.

---

* Taken from the Toxic Information Series issued by the EPA
Office of Pesticides and toxic substances TS-793 Wash DC

20 Constitution Drive
Cold Spring, N.Y. 10516
July 3,1988

The Honorable Daniel Patrick Moynihan
733 Third Ave.
New York, N. Y. 10017

Dear Sir:

The Marathon Battery site in Cold Spring-on-Hudson, N. Y. is rated number 6 on the Superfund list of hazardous sites scheduled for clean-up. On June 13, 1988, the residents of Philipstown met with representatives of the EPA in a public forum for discussion of the most recent findings of the ongoing study of the site.

At this meeting, the results of testing done on the factory site itself were detailed and the Proposed Remedial Action Plan was released for public comment. The plan of action is to be finalized in the spring of 1989.

At this time, we, the residents of Constitution Drive, which is adjacent to the contaminated property, are seeking your assistance in our request to the EPA to speed up the investigation. We have been waiting for answers since the winter of 1984. If this site is as dangerous as we have been led to believe, why has the urgency to protect public health been neglected by the EPA dragging out this investigation for years?

We were unofficially told at the June 13 meeting that there is a high contamination level of cadmium in several backyards along Constitution Drive. We are outraged by the lack of communication from the EPA and feel it is about time we were given facts without waiting for a public meeting.

The Village of Cold Spring and surrounding Philipstown residents have signed a petition requesting that the EPA reconsider the decision of "No Action" involving the vault which contains cadmium dredged from the Hudson River in 1974. We feel the vault should not be left on the property for future monitoring because the past 15 years have shown no monitoring systems and total neglect of the property above the vault.

We have been patient for four years but have had it and beg your influence on our behalf to get the Superfund working for the good of the people.

Please help!

Sincerely yours,

Constitution Drive Residents

C. C. A. R. T.

Concerned Citizens About Removing Toxins
20 Constitution Drive
Cold Spring, NY 10516

July 5, 1988

Magalie Beausejour, Project Manager
U.S. Environmental Protection Agency
Emergency and Remedial Response Division
26 Federal Plaza, Room 23-102
New York, New York 10278

Dear Ms. Beausejour:

We are writing to you to comment concerning the EPA proposed remedial action plan for the Marathon Battery site.

We do not agree with any of the EPA's choices regarding the dredge vault as remedy to the site.

We disagree with alternative V-1, no action, for a number of reasons. It appears the decision is based solely on price and not on the effects of the vault becoming compromised. In the 15 years since the vault was constructed, there has been absolutely no maintenance save for one grass cutting. There is no reason to believe that this will change. Asphalt and clay are not impervious to root and vegetation damage. Damage may already be done to the vault since it has been 21 months since its last inspection. Posting of signs and installing fences are not a guarantee of safety. The signs which were erected in the cove and marsh area are illegible after less than 24 months and fences are no longer a deterrent to vandalism.

The danger to health for the Cold Spring area and surrounding communities such as Beacon, Garrison, and the entire Philipstown area as a whole will not be lessened by no action.

We, the citizens on the attached petitions, demand that the EPA adopt option V-6 as the preferred option for the dredge spoils vault.

NO LONGER WILLING TO WAIT FOR ANSWERS,

C.C.A.R.T.

cc: Alphonse D'Amato
Daniel P. Moynihan
Hamilton Fish
Mary C. Goodhue
George Pataki
Peter C. Alexanderson

TED STATES ENVIRONMENTAL PROTECTION AGENCY

AUG 23 1988

Honorable Daniel Patrick Moynihan
United States Senator
733 Third Avenue
New York, NY 10017

Dear Senator Moynihan:

This is in response to your July 13 and July 19, 1988 letters written on behalf of the residents of Constitution Drive and Antonia Garufi, respectively, regarding the Marathon Battery Company Superfund site, located in Cold Spring, New York.

The Marathon Battery Company site includes a former nickel-cadmium battery manufacturing facility, the Hudson River in the vicinity of the Cold Spring pier, and a series of river backwater areas known as East Foundry Cove, West Foundry Cove, and Constitution Marsh. There are presently 799 Superfund sites on the National Priorities List; the Marathon Battery Company site is ranked number 715.

In your constituents' letters, they complain that the Environmental Protection Agency (EPA) is "dragging out" the investigation of this site. Admittedly, the ongoing investigation of this site has taken a number of years to perform. But because the affected area is over 400 acres, and because of the bioaccumulative nature of cadmium, the primary contaminant of concern at this site, the ongoing investigation has been a very complex and time-consuming undertaking. To determine the full extent of contamination present, and what threat this contamination poses to public health and the environment, over 1,200 biota, surface water, sediment, groundwater, dust, air, and soil samples have been collected, analyzed, and evaluated since the field work commenced in the spring of 1984. Our consultant has also performed extensive laboratory testing to evaluate various treatment alternatives for addressing the heavy metal contamination present in East Foundry Cove sediments and on and off-site soils. In addition, two remedial investigation/feasibility study (RI/FS) reports have been prepared to define the nature and extent of the contamination and to identify and evaluate remedial alternatives for two portions of the site.

Based upon the results of the first RI/FS, in September 1986, EPA selected a remedy for the East Foundry Cove Marsh/Constitution Marsh portion of the site. This remedy, which involves removal of the contaminated sediments, followed by chemical fixation and off-site disposal, is currently under design. It is anticipated that this design will be completed in the spring of 1989.

The second RI/FS, pertaining to the former battery facility portion of the site, was the subject of the June 13, 1988 public meeting referenced in your constituents' letters. At this public meeting, my staff discussed the preferred remedy, which was identified as decontamination of the former battery facility, excavation and chemical fixation of the heavy metal-contaminated soils on the former battery facility grounds and adjacent residential yards, excavation and thermal treatment of on-site soils contaminated with volatile organics, and continued monitoring of the groundwater and a dredge spoils vault containing cadmium-contaminated sediments dredged from East Foundry Cove in the early 1970s. No action for the vault was suggested because, based upon EPA's evaluation of the results from the groundwater monitoring wells installed around the vault, which showed no detectable levels of cadmium, as well as an evaluation of the vault's design plans and specifications, the vault appears to be constructed in such a manner so as to prevent the release of the contaminated sediments to the environment.

While the vault appears to be an effective containment system, and leaving it in-place does not appear to pose an immediate threat to public health or the environment, other evaluation criteria, such as community acceptance and permanence, will be considered further before EPA selects a remedy for this portion of the site.

In the past, EPA collected soil samples from residential yards adjacent to the former battery facility to determine whether off-site migration of heavy metal contamination from the site had occurred, and if present, whether it posed an immediate health threat to the residents. As noted in your letter, release of the data was inadvertently delayed. These data, which indicate no immediate health threat, were discussed with area residents at the June 13, 1988 public meeting.

Following the public meeting, the data and an explanation of it were forwarded to the residents whose yards were sampled.

Should you have any questions, please contact me, or have your staff contact Jeane Kosianski of the Office of External Programs at (212) 264-7834.

Sincerely,

William J. Muszynski

William J. Muszynski, P.E.
Acting Regional Administrator

cc: Thomas C. Jorling, Commissioner
New York State Department of
Environmental Conservation

bcc: Alice Green, A-101

THE ASSEMBLY
STATE OF NEW YORK
ALBANY

GEORGE E. PATAKI
Assemblyman 91st District

DISTRICT OFFICES
☑ Crossroads Shopping Center
Peekskill, New York 10566
(914) 739-2150

☐ 1 Freeland Street
Monroe, New York 10950
(914) 783-2513

RANKING MINORITY MEMBE
Committee on
Environmental Conservation

COMMITTEES
Ways & Means
Labor
Ethics

ALBANY OFFICE
☐ Room 534
Legislative Office Building
Albany, New York 12248
(518) 455-4166

Muszynski
cc: Luftig/Action
Marshall

July 20, 1988

Response due
8/16/88
RA Sig.

EPA
26 Federal Plaza
New York, N.Y. 10278

Dear Sirs:

I represent the Village of Cold Spring and am writing in connection of the Marathon Battery Superfund site in the Village of Cold Spring, County of Putnam in New York State.

Neighbors of the site are concerned about the extensive delay in taking action to clean up and remediate the site, and particularly the lack of communication concerning possible contamination to the backyards and adjacent properties of residents near the site on Constitution Drive.

I would appreciate your advising me of the status of this matter and also of whether any testing or test results can be provided. In addition, can better communications be established so that the residents of Constitution Drive can be better informed, and do not have to live in fear?

Thank you for your prompt attention to this most important matter.

Very truly yours,

G. E. Pataki

GEORGE E. PATAKI
Member of Assembly

GEP/aos

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

AUG 2 6 1988

Honorable George E. Pataki
New York State Assemblyman
Crossroads Shopping Center
Peekskill, NY 10566

Dear Mr. Pataki.

This is in response to your July 20, 1988 letter regarding the Marathon Battery Company Superfund site, located in Cold Spring, New York.

The Marathon Battery Company site includes a former nickel-cadmium battery manufacturing facility, the Hudson River in the vicinity of the Cold Spring pier, and a series of river backwater areas known as East Foundry Cove, West Foundry Cove, and Constitution Marsh.

In your letter, you indicate that your constituents have complained about the extensive delay in remediating the site. Admittedly, the ongoing investigation of this site has taken a number of years to perform. But because the affected area is over 400 acres, and because of the bioaccumulative nature of cadmium, the primary contaminant of concern at this site, the ongoing investigation has been a very complex and time-consuming undertaking. To determine the full extent of contamination present, and what threat this contamination poses to public health and the environment, over 1,200 biota, surface water, sediment, groundwater, dust, air, and soil samples have been collected, analyzed, and evaluated since the field work commenced in the spring of 1984. Our consultant has also performed extensive laboratory testing to evaluate various treatment alternatives for addressing the heavy metal contamination present in the East Foundry Cove sediments and on- and off-site soils. In addition, two remedial investigation/feasibility study (RI/FS) reports have been prepared to define the nature and extent of the contamination and to identify and evaluate remedial alternatives for two portions of the site.

Based upon the results of the first RI/FS, in September 1986, the Environmental Protection Agency (EPA) selected a remedy for the East Foundry Cove Marsh/Constitution Marsh portion of the site. This remedy, which involves removal of the contaminated sediments, followed by chemical fixation and off-site disposal, is currently under design. It is anticipated that this design will be completed in the spring of 1989.

The second RI/FS, pertaining to the former battery facility portion of the site, was the subject of a June 13, 1988 public meeting in Cold Spring. At this public meeting, my staff discussed the preferred remedy, which was identified as decontamination of the former battery facility, excavation and chemical fixation of the heavy metal-contaminated soils on the former battery facility grounds and adjacent residential yards, excavation and thermal treatment of on-site soils contaminated with volatile organics, and continued monitoring of the groundwater and a dredge spoils vault containing cadmium-contaminated sediments dredged from East Foundry Cove in the early 1970s.

At this time, we are evaluating the comments received on the RI/FS and proposed remedy. We anticipated selecting a remedy for this portion of the site by September 30, 1988.

In the past, EPA collected soil samples from residential yards adjacent to the former battery facility to determine whether off-site migration of heavy metal contamination from the site had occurred, and if present, whether it posed an immediate health threat to the residents. As noted in your letter, release of the data was inadvertently delayed. These data, which indicate no immediate health threat, were discussed with area residents at the June 13, 1988 public meeting. Following the public meeting, the data and an explanation of it were forwarded to the residents whose yards had been sampled.

In your letter, you ask that "better communications be established so that the residents of Constitution Drive can be better informed." Please note, however, that a very active and ongoing community relations program has been established for this site. Numerous public meetings and informal information sessions have been held over the past few years. In addition, fact sheets have been provided to the public throughout the project. We believe, that, with the exception of the residential yard sample results, all vital information has, and will continue to be, disseminated to the public in a timely manner.

Should you have any questions, please contact me, or have your staff contact Stephen Luftig of my staff at (212) 264-8672.

Sincerely,

William J. Muszynski, P.E.
Acting Regional Administrator

cc: Thomas C. Jorling Commissioner
New York State Department of
Environmental Conservation

bcc: CCO

21ST DISTRICT NEW YORK

WASHINGTON OFFICE
2208 RAYBURN BUILDING
PHONE (202) 225-5441

DISTRICT OFFICES
POUGHKEEPSIE OFFICE
82 WASHINGTON STREET
POUGHKEEPSIE, NY 12601
PHONE (914) 452-4220

CARMEL OFFICE
70 GLENEIDA AVENUE
CARMEL, NY 10512
PHONE: (914) 225-4200

NEWBURGH OFFICE
1002 BREUNIG ROAD
STEWART INTERNATIONAL AIRPORT
NEWBURGH, NY 12550
PHONE: (914) 564-4303

Congress of the United States
House of Representatives
Washington, DC 20515

JUDICIARY COMMITTE
VICE CHAIRMAN

SUBCOMMITTEE ON MONOPOLIES
AND COMMERCIAL LAW
VICE CHAIRMAN

SUBCOMMITTEE ON IMMIGRATION
REFUGEES AND INTERNATIONAL LA

SUBCOMMITTEE ON
CRIMINAL JUSTICE

JOINT ECONOMIC
COMMITTEE

VICE CHAIRMAN,
NEW YORK STATE REPUBLICAN
CONGRESSIONAL DELEGATION

EXECUTIVE COMMITTEES
ENVIRONMENTAL AND
ENERGY STUDY CONFERENCE

CONGRESSIONAL ARTS
CAUCUS

STEERING COMMITTEE
NORTHEAST-MIDWEST
CONGRESSIONAL COALITION

VICE CHAIRMAN
BOARD OF VISITORS
U.S. MILITARY ACADEMY

July 22, 1988

Honorable Christopher J. Daggett
Regional Administrator
United States Environmental Protection Agency
Region II
26 Federal Plaza
New York, NY 10278

Dear Mr. Daggett:

I am writing to express my dissatisfaction with the EPA's handling of the Marathon Battery Superfund Site in Cold Spring, New York.

The EPA has neglected to inform the residents of Constitution Drive, who own property adjacent to the Battery facility, of the results of soil and water sampling taken on their property in July, 1986. My office has been in contact with Mr. Joel Singerman of the EPA, who informed my staff that at last the residents on Constitution Drive will receive the results of the testing done on their own property. The two-year delay in notifying the home owners of the amount of contamination on their property is inexcusable. The EPA is, futhermore, neglecting its responsibility to those residents by now sending them tests which were done two years ago. Testing should be taken on those properties, and be immediately reported to the home owners, so updated data is available.

I am dissappointed in the EPA's intent to take the no-action alternative for the dredge spoils vault. I understand that the Record of Decision has not been made yet and I am expecting that the opinions of the concerned citizens of Cold Spring will influence the EPA's final decision. I encourage the EPA to give every consideration to the citizens' concerns regarding the vault.

Your immediate attention to these matters is greatly appreciated. In the future, I will be hoping to see a more responsible and conscientious effort on behalf of Cold Spring residents. Thank you for your time and consideration.

With every best wish, I am,

Sincerely,

Hamilton Fish, Jr.
Member of Congress

HF:hw

cc Magalie Beausejour
Joel Singerman
Honorable Barbara A. Murphy
Caroline Krebs
Concerned Citizens of Cold Spring
Antonia Garufi
Honorable Roger Chirico

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

AUG 2 6 1988

Honorable Hamilton Fish, Jr.
House of Representatives
Washington, D.C. 20515

Dear Mr. Fish:

This is in response to your July 22, 1988 letter regarding the Marathon Battery Company Superfund site, located in Cold Spring, New York.

The Marathon Battery Company site includes a former nickel-cadmium battery manufacturing facility, the Hudson River in the vicinity of the Cold Spring pier, and a series of river backwater areas known as East Foundry Cove, West Foundry Cove, and Constitution Marsh.

In your letter, you express concern regarding the preferred remedy for the on-site dredge spoils vault which contains cadmium-contaminated sediments dredged from East Foundry Cove in the early 1970s. No action for the vault was suggested because, based upon the Environmental Protection Agency's (EPA's) evaluation of the results from the groundwater monitoring wells installed around the vault, which showed no detectable levels of cadmium, as well as an evaluation of the vault's design plans and specifications, the vault appears to be constructed in such a manner so as to prevent the release of the contaminated sediments to the environment.

While the vault appears to be an effective containment system, and leaving it in-place does not appear to pose an immediate threat to public health or the environment, other evaluation criteria, such as community acceptance and permanence, will be considered further before EPA selects a remedy for this portion of the site.

In the past, EPA collected soil samples from the residential yards adjacent to the former battery facility to determine whether off-site migration of heavy metal contamination from the site had occurred, and whether it posed an immediate health threat to the residents. As noted in your letter, release of the data was inadvertently delayed. These data, which indicate no immediate health threat, were discussed at a June 13, 1988 public meeting. Following the public meeting, the data and an explanation of it were forwarded to the residents whose yards were sampled.

In your letter, you suggest that additional sampling of the residential yards be performed.

As part of the remedial design, intensive sampling of the adjacent residential yards will be performed to determine the extent of the soils requiring remediation.

Should you have any questions, please contact me, or have your staff contact Jeane Rosianski of the Office of External Programs at (212) 264-7834.

Sincerely,

William J. Muszynski, P.E.
Acting Regional Administrator

cc: Thomas C. Jorling, Commissioner
New York State Department of
Environmental Conservation

bcc: Alice Greene, A-101

4 Depot Square
Cold Spring, New York
August 18, 1988

Ms. Magalie Beausejour
Project Manager Marathon Co. Site
U.S. Environmental Protection Agency
Emergency Remedial Response Division
26 Federal Plaza, Rm 23-102
New York, New York

Dear Ms. Beausejour,

Through discussions with the DEC, EPA, and Cold Spring residents at the August 11th meeting, concerned citizens of Cold Spring have reason to believe that emissions discharged through a roof top venting system, coming from the battery plant facility, while in operation, may have caused some of the migration found to be on the surface in the yards of family homes on Constitution Drive. For this reason we believe it may have depended on which way the wind blew as to the direction that this migration of cadmium, nickel substance was carried. Houses located on the opposite side of the street on Kemble Avenue need soil sampling as well as the yards of houses on the uphill side of the street in the vicinity of Wall Street, Furnace Street, Marion Avenue and Benedict Street. These areas mentioned must be taken into consideration.
Even more importantly is the information we have received concerning the storm sewer drainage on the corner of Kemble Avenue and Rock Street. This storm sewer drainage vent had overflow problems during heavy rains and possibly during times when the plant was in operation and effluent was passing through these pipes below. There was mention also made that the system may have been damaged by the use of different chemicals and acids which may have deteriorated the pipeline. A Mr. Frank Scalzo lives on 25 Kemble Avenue and he mentions that his basement was flooded on several occasions through the years.
It is possible that surface runoff fom rainwater overflow may have carried particles of discharged effluent downhill in the direction of Rock Street toward Main and on down. This area should be added to the soil sampling grid. Rock Street - Main Street - Lynn Terrace - and Depot Square. Other areas of immediate concern are houses located on the opposite side of the street on Constitution Drive. Enclosed are adresses.

Concerned Citizens of Cold Spring are asking for an immediate response to these concerns. The above reasons given need immediate attention in order to establish whether surface rainwater runoff of cadmium, nickel substances have migrated downhill from Rock Street storm sewer overflow..
Please see : New York Dept. Environmental Conservation September 1985 document prepared by Acres International Corporation. Norman H. Nosenchuck P.E. Director

GS 9 para. 2

1953 to 1965 " the Wastewater treatment system " involved pumping of untreated [illegible]e products into the Cold Spring Sewer System which was subsequently discharged into the Hudson River at the pier site. It is believed that the pier site was subjected to a direct discharge of contaminants during the 1970's........

Gs- 10 para. 2 The Main Street Storm Sewer was used to transport Marathon battery effluent resulting in signifigantly elevated levels of cadmium, nickel, and cobalt in the Pier Site.

GS-5 para. 3

" From December 1971 until termination of the battery manufacturing operation around March 1979 it is believed that waste water was discharged via the Village Storm Sewer at the pier site. Also that equipment installation and operation difficulties precluded the attainment of effluent discharge standards during 1975."

These concerns add considerable areas and yards that need to be tested during soil sampling stages of Phase II and III.

Over the years the continued use of different chemicals and acids, during the process of discharge of this cadmium substance, may have caused the damage and deterioration of the storm sewer pipes which had to be replaced. If these pipes were cracked at any time during effluent discharge these contaminated substances may have been carried through rainwater overflow of the storm sewer system. If this is true this migration may be all along Rock Street and also Main Street.

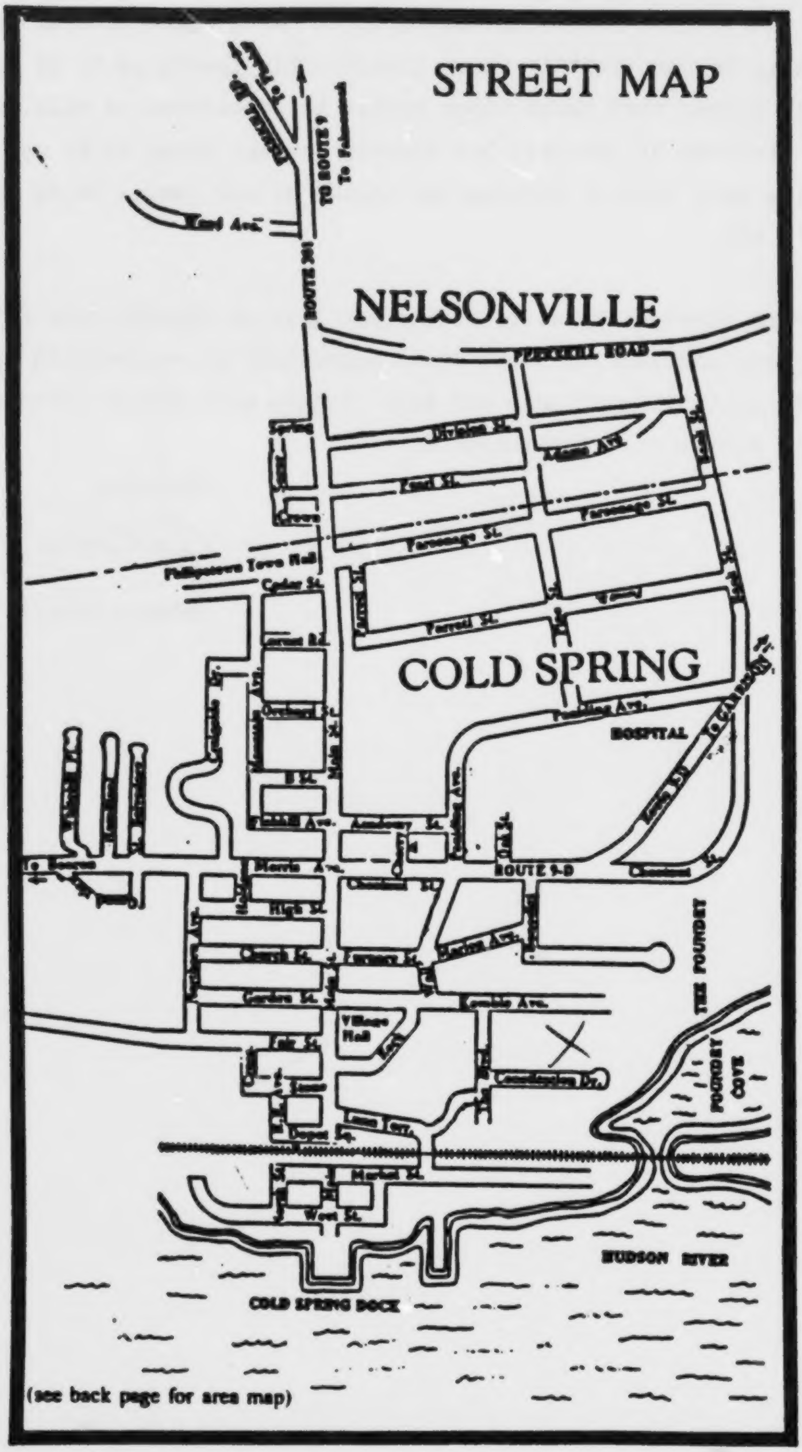
Concerned citizens of Cold Spring have reason to believe that exposure to these toxic elements was not confined only to the workplace but that these chemicals may have left residue in basements which were flooded due to storm sewer overflow. The soils of Rock Street are of absolute priority for sampling. Please respond to these staements. Thank you.

Sincerly,

Antonia Garufi

Antonia Garufi

enjoyment of those who get pleasure from observing nature.



(see back page for area map)

For General Information:

The Hudson River Valley Asso
72 Main Street, Cold Spring, N

The Cold Spring Area Chamb
(914) 265-9060

West Point Visitors Bureau
(914) 938-4011

For Music and General P

Bardavon 1869 Opera House
35 Market Street
Poughkeepsie, NY (914) 473-5

Howland Center for Cultural
Cor. Main and Tioronda Av
Beacon, NY (914) 831-4988

Paramount Center for the Art
1008 Brown Street
Peekskill, NY (914) 739-2333

For History, Nature Study

BOSCOBEL: Rt. 9D just south of Co
Spring, this excellent example
Federal residential architecture is op
to the public. Beautiful grounds an
spectacular view of the Hudson. C
(914) 265-3638.

**CLARENCE FAHNESTOCK STA
PARK:** Located on Rt. 301 betwe
Cold Spring and Carmel, this park
fers hiking, fishing, boating, camp
Call (914) 225-7207.

**CONSTITUTION MARSH WILD LI
SANCTUARY:** Located just south
Cold Spring on the Hudson. Ca
trips can be arranged by calling (9
265-3119. National Audubon Soc
operates this outstanding sanctua

FOUNDRY SCHOOL MUSEU
Located on Chestnut Street in C
Spring just south of the Butterf
Pharmacy. Housed in a 140-year
schoolhouse, it has all kinds of hist
exhibits, photos, books and items.
the Putnam County Historical Soc
at (914) 265-4010.

***GRAYMOOR:** Located on Rt. 9.*

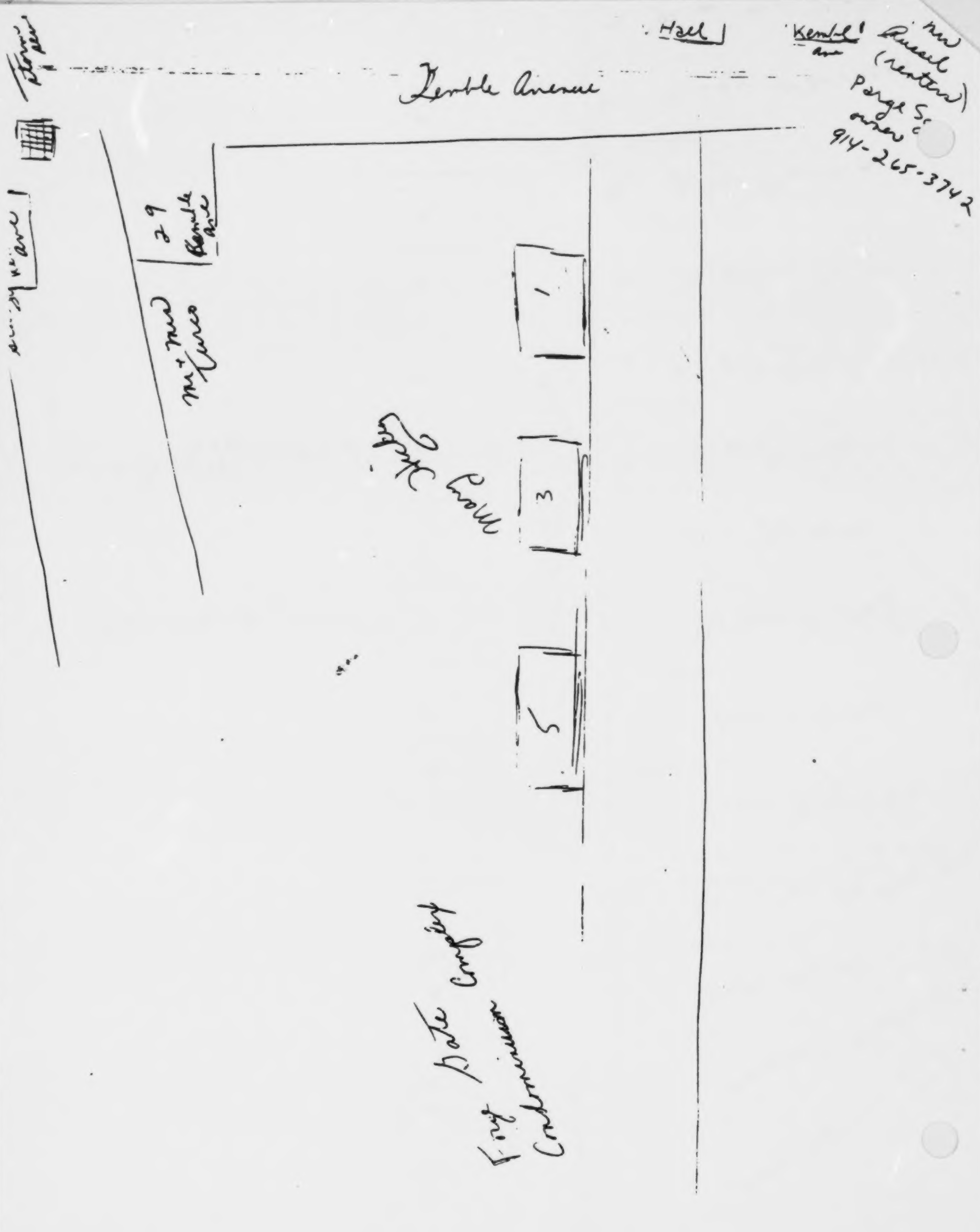
Concerned Citizens of Cold Spring would like to request that soil samples be taken on the opposite side of the street on Constitution Drive where several houses were missed. Especially in the vicinity where unacceptable levels up to 67 PPM were found. It is only proper that these other houses be considered as well, since they are in the vicinity of the Marathon Battery Company Site. We do not feel very comfortable living here without knowing the status of our yards. We do not know if we are at risk or not.

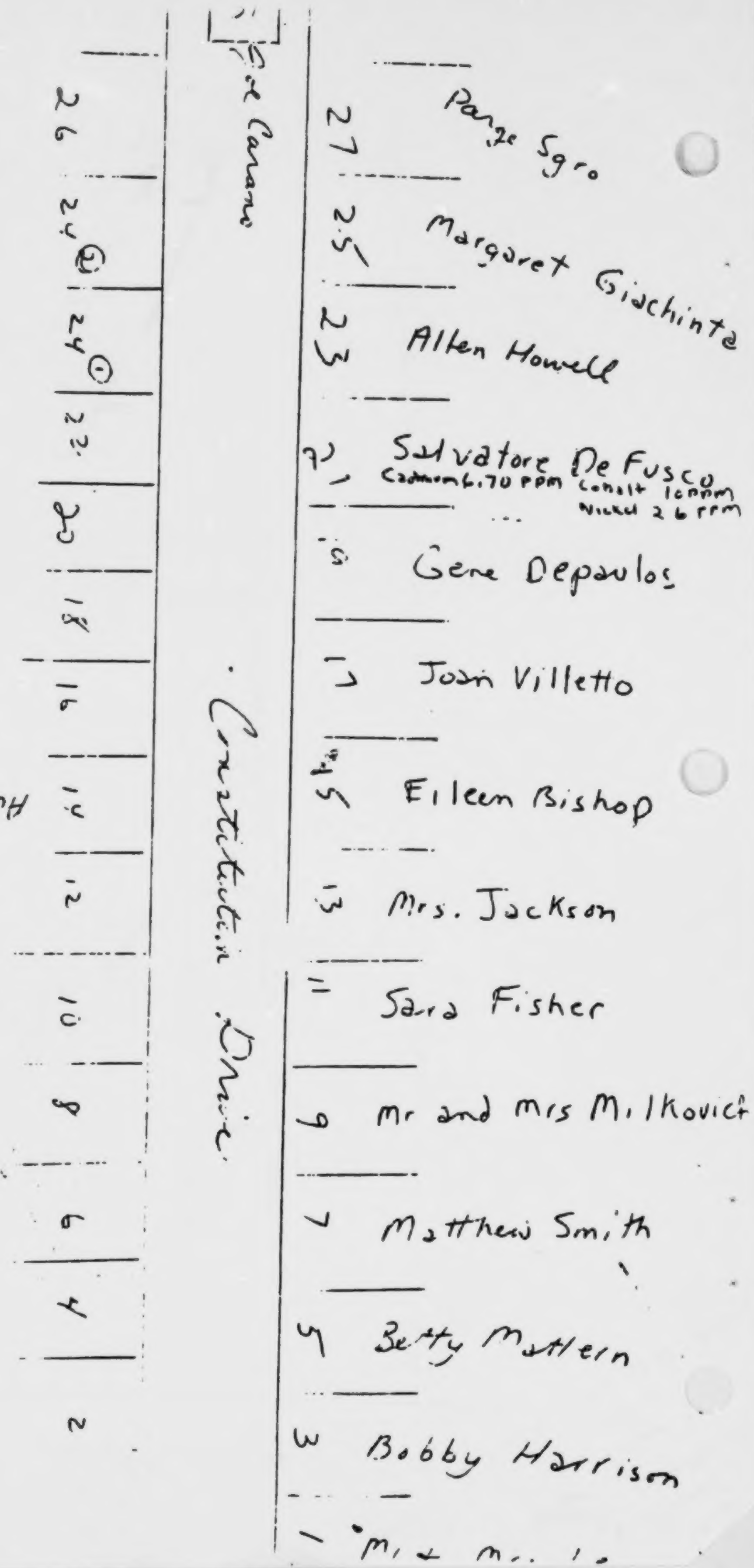
These concerns were conveyed to me by people who live on Constitution Drive. I thank you for your consideration but would appreciate an explanation if the answer is no. We would like to know why soil samples will not be taken on the other side of the street on Constitution Drive.

Sincerly,

Antonia Garufi

Antonia Garufi


Storm sewer
Hall
Kemble Ave
Mrs Russell (renter)
Paige Sr owner
914-265-3742
Kemble Avenue
Ave
29 Kemble Ave
Mr + Mrs Turco
1
3
5
Mary Hickey
First Date Company
Communion

Fox Canano
Constitution Drive
27 Panze Sgro
25 Margaret Giachinte
23 Allen Howell
21 Salvatore De Fusco
Cadmium 6.70 PPM Cobalt 10PPM
Nickel 26 PPM
19 Gene Depaulos
17 Joan Villetto
15 Eileen Bishop
13 Mrs. Jackson
11 Sara Fisher
9 Mr and Mrs Milkovich
7 Matthew Smith
5 Betty Matlern
3 Bobby Harrison
1 Mr + M..
26
24 ②
24 ①
22
20
18
16
14 Aurelio Giachinta
12
10 Mr and Mrs Jeff Butler
8
6
4
2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK, NEW YORK 10278

SEP 19 1988

Honorable Hamilton Fish, Jr.
Member, U.S. House of Representatives
Building 710
Stewart Airport
Newburgh, N.Y. 12550

Dear Mr. Fish:

This is in response to your constituent's August 18, 1988 letter and your August 26, 1988 letter regarding the Marathon Battery Company Superfund site.

In her letter, Ms. Garufi expresses concern regarding the extent of the contamination of soils in Cold Spring resulting from heavy metal-contaminated air emissions from the battery facility when it was in operation.

The Environmental Protection Agency collected soil samples from residential yards located adjacent to the former battery facility to determine whether off-site migration of heavy metal-contaminated dust from the facility had occurred, and if present, whether it posed an immediate health threat to area residents. While we were able to determine from the data that an immediate health threat does not exist, we recognize that additional soil sampling is necessary to provide a more definitive characterization of the extent of heavy metal contamination which has migrated from the site. To satisfy these data needs, additional soil samples were collected at various locations in the vicinity of the site in early September 1988. In addition, as part of the remedial design, intensive sampling of the site and the adjacent residential yards will be undertaken.

The storm sewer system underlying Main Street was used to transport the battery facility's process wastes to the Hudson River. Ms. Garufi expresses concern about the possibility that heavy metal contamination from the facility may have been released to the environment via a rupture in, or overflow from the storm sewer system.

Based upon information provided by Village of Cold Spring officials, it is our understanding that a portion of the Main Street sewerline deteriorated and was replaced in the early 1980s. In August 1988, we reviewed the Village's sewerline plans, and discussed with Village officials the sewerline break. We will, in the next few weeks, sample the soils in the vicinity of the sewerline break to determine whether this rupture contaminated the soils in the vicinity of the break.

We were unaware of any overflow problems associated with the sewer system until Ms. Garufi expressed concern in her letter. We have asked our consultant to investigate this, and to determine whether the break in the sewerline may have resulted in the contamination of any residents' basements.

We will keep you informed of the results of our ongoing investigations.

Should you have any questions, please contact me, or have your staff contact Jeane Rosianski of my staff at (212) 264-7834.

Sincerely,

William J. Muszynski, P.E.
Acting Regional Administrator

cc: Thomas C. Jorling, Commissioner
New York State Department of
Environmental Conservation

bcc: Alice Greene, A-101

APPENDIX B

NATIONAL AUDUBON SOCIETY MEMO

TO: Ms. Magalie Beausejour
Remedial Project Manager
U.S. Environmental Protection Agency
26 Federal Plaza
New York, NY 10278

FROM: James P. Rod
Manager, Constitution Marsh Sanctuary
National Audubon Society
RFD #2, Rt. 9D
Garrison, NY 10524

RE: Draft RI/FS, Marathon Battery Company Site
(Former Battery Plant Grounds)
Cold Spring, NY

DATE: May 16, 1988

Following are my comments on the Draft Supplemental RI/FS:

1 RI - page 11-1. Ecosystem of Constitution Marsh. I do not "fear that some alternatives, such as dredging East Foundry Cove, would permanently damage Constitution Marsh." In fact, I believe, that a thorough dredging of East Foundry Cove, preferably to 10 ppm, is the best way to protect Constitution Marsh from additional cadmium contamination, assuming that proper barriers are constructed to keep suspended sediments contained within East Foundry Cove during dredging, and that tidal flows are not interrupted.

2 RI - page 5-25. Integrity of Dredge Spoils Vault. The dredge spoils vault is presumed to be intact based upon results from monitoring wells V1 through V5. This conclusion is based partly upon detection limits which may be too high. A more sensitive analysis might detect some leakage. Further, even if the vault is still perfectly intact, (which may well be the case after only 13 years), at our April 20 meeting at EPA headquarters, I recall a statement to the effect that the expected life of such a vault is on the order of 30 years. Since the vault was inadequately monitored (probably not monitored at all) during its first ten years, since future monitoring may not be perfect, and since no one knows what eventual use may be made of the battery plant grounds and building once cleanup is complete, it seems to make sense to me to remove the vault and its potential threat while equipment and personnel are in place. I assume it will be easier to dispose of the vault while it is intact, rather than wait until it actually starts leaking.

3 RI - page 6-22. Conclusion. After treatment with the Chemfix process ..."treated metal contaminated soil can be considered as non-hazardous waste." Can Chemfix Technologies, Inc. guarantee the wastes to remain non-hazardous forever?

4 RI - page 7-27. Inhalation of Fumes During a Fire Event. I am not sure that I fully understand this section and the information presented on the vaporization temperature of cadmium and the ignition point of paper on page 7-18. Just because paper burns at 454 degrees F. (according to Ray Bradbury, whose famous science fiction novel concerning the destruction of books in a futuristic society, Fahrenheit 451, paper burns at 3 degrees less than Ebasco's figure, but I won't quibble) doesn't necessarily mean that a warehouse fire burns no hotter than that temperature. I have seen building fires that melted glass and twisted steel girders, none of which happens at 454 degrees. Whether such fires get hot enough to vaporize cadmium, I am not sure. I am concerned (as is the Cold Spring Fire Department, as you recall from the meeting we attended in the Firehouse) that the high winds generated by a raging fire may cause the cadmium dust to be precipitated over a wide area downwind of the fire.

On that subject, on page 7-28, top, last sentence, concerning the amount of dust in a worst-case event, "Persons...could not be exposed to this level of particulates and be expected to breath (breathe) for any length of time." Does this mean that firemen and nearby residents need not be concerned about cadmium poisoning because they will merely suffocate instead? If, indeed, there is no particular toxic threat in case of a fire, have you so informed the Cold Spring Fire Department?

5 Feasibility Study. page 2-25. Truck. If the treated wastes to be transported are non-hazardous, why must trucks be decontaminated and why must special permits for hauling hazardous materials be obtained?

6 FS page 2-26. Train. The elimination of this transportation alternative is premature, as I have attempted to explain before. While it is true that the railroad on the western edge of the site is an MTA commuter line, it is also more than that. It is also the AMTRAK passenger line with service to Buffalo, among other places, and it is a freight line. A freight train uses this line at least once, and often twice, each night during the hours when commuter service is not offered, generally between the hours of midnight and 5:00 a.m.. In addition, freight trains often use the tracks on weekend days when commuter traffic is less. For example, last Sunday, May 15, I was in Constitution Marsh with a canoe tour group. At about 11:00 a.m., a one-hundred + car freight train went past the marsh, in broad daylight, and was photographed on videotape by Channel WBTA in Beacon, who was with me filming the group on the canoe tour.

There is daily freight service on this line!!. A short spur could easily be constructed on the existing old railroad bed along the north side of Foundry Cove. A switch engine could push loaded cars onto the main line where they could be coupled with little delay onto passing freights, and the cars could be hauled to Buffalo. From Buffalo to Model City disposal site, the materials could be transferred to trucks, thus eliminating the need for construction of a second spur to Model City.

As an alternative, loaded trucks could be placed on flatcars, hauled by freight train to Buffalo, then driven off for the short trip to Model City. Empty trucks could then be driven back to Cold Spring for reloading, cutting in half the potential number of trips needed through Cold Spring. I don't believe the public yet understands that perhaps 7,000 trucks will pass through the Village (counting loaded outbound and empty inbound trips from both East Foundry Cove --6,000 -- and from cleanup of the plant site -- 1,000), under the current scenario. This will surely be the most unpopular aspect of the cleanup effort and will almost surely lead to accidents and road damage in the Village. Please reopen and reconsider the railroad option.

In summary, I support the cleanup, fixation and removal of contaminated soil on the battery plant grounds, cleanup of the dust and other contaminants in the building, and removal of the existing burial vault, in the safest and most cost-efficient manner. The end result should be clean grounds and a clean building that can then be put to some productive use.

Thank you for considering these comments.

Sincerely,
Jim Rod
James P. Rod
Manager
Constitution Marsh Sanctuary

cc: Ron Sloan
Paul Keller

LETTER FROM J. ROD - May 16, 1988

COMMENT NO.	RESPONSE
Paragraph 1	The East Foundry Cove portion of the site will be addressed in the Area III Record of Decision.
Paragraph 2	After consideration of all available information regarding the vault, it is the agency's conclusion that removal of the vault is a more appropriate solution for this portion of the site in assuring a higher level of confidence in the long-term effectiveness and permanence of the remedy, than the no-action alternative.
Paragraph 3	One of the objectives of the treatability study performed by Chemfix Technologies, Incorporated (CTI) is to treat the waste at an optimum reagent ratio to pass the evaluations under the Toxic Characteristic Leaching Procedure (TCLP) and the Multiple Extraction Procedure (MEP). Since the TCLP test has not been promulgated, the waste will have to pass the EP Toxicity Test in order to be classified as a non-RCRA hazardous waste.
Paragraph 4	The major fire hazard in the former battery plant results from the books warehoused in the building. No danger to fire fighters or nearby residents exists from

	cadmium vaporizing during the fire. Any cadmium exposure to nearby residents or fire fighters will be via the inhalation of cadmium particulates in the smoke, not cadmium fumes or vapors which are more toxic.
Paragraph 5	Prior to the cleanup of the entire site, there is a possibility that the trucks might be contaminated by driving them on site (e.g., contaminated fugitive dust, etc.). For safety it is suggested in the FS report that the trucks be decontaminated before leaving the site. The contractor hauler is required by law to obtain a state approved license before hauling either hazardous or nonhazardous waste over the public highways.
Paragraph 6	Alternatives for waste transport will be considered during the design phase of this project.

PUTNAM COUNTY NEW YORK

PETER C. ALEXANDERSON
County Executive

ENID L. CARRUTH, M.P.H.
Public Health Director

JOHN SIMMONS, M.D.
Deputy Commissioner

JOHN KARELL Jr., P.E.
Director

DEPARTMENT OF HEALTH
Division Of Environmental Health Services
110 Old Route Six Center, Carmel, New York 10512
(914) 225-0310

June 15, 1988

Magalie Beausejour
Project Manager
USEPA
26 Federal Plaza, Room 23-102
New York, NY 10278

RE: Marathon Battery Company
Putnam County, New York

Dear Ms. Beausejour:

As a result of last night's public meeting in Cold Spring on the subject site, it has become plainly clear that improvements are needed in the manner in which information is disseminated. Of major concern is the lack of notice to land owners of the results of analyses of soil from their yards. Regardless of the results, they should have been forwarded to the landowners with an explanation as soon as they were available. Because some of the levels were found to be significantly greater than acceptable levels for growing food-chain crops, it is even more important that the proper advisories or warnings be communicated.

Another area which could stand improvement is routine direct communication with individuals in the community. Direct mailings to public officials (village, town, and county) as well as past public meeting attendees and adjacent property owners is recommended. Lack of receipt of the developed fire plan by the fire chief is another indication that needed information is not being sent to the proper people.

Public clarification, perhaps by means of a personal letter mailed directly to each public meeting participant, of the specifics of the existing sediment vault construction is apparently needed to address what appears to be the major point of community opposition. Clarification should include descriptions of the vault construction, design criteria (inlayman's terms), whether design life is 30 or 2000 years, what could cause failure, probability of failure as compared to other known risks (e.g. automobile accident), what could occur if failure occurs and its potential impact on public health (again, compared to other common risks), and what will occur in the event of vault failure and who is responsible for remediation. Though much of this information is in the June 88 Update, communication by means of a personal letter may serve to reassure the public of EPA's competancy.

Selection of alternative GW-1 should not proceed until identification of long-term water supply for the village is defined. Period requiring identification should coincide with expected length until groundwater flushing is completed. If no reasonable expectation of groundwater use can be expected for consumptive purposes (e.g. due to salt water intrusion) then this barrier to selection of alternative GW-1 would be removed.

Alternative S-4 has identified hazards associated with increased truck traffic. This hazard appears to be of such significance that construction of a new site access road that bypasses the village is indicated. Another identified alternative is construction of a rail spur which may be preferable to construction of a new access road. The probable impact on land adjacent to the site to achieve remediation to the 20 ppm level for cadmium has not been discussed. If remedial activities are expected to be undertaken on residential property, significant public relations efforts will be necessary to inform homeowners that their front yards are going to be removed. This should also be addressed in the aforementioned public clarification statement.

If possible, it is requested that this Department routinely receive five copies of future Superfund Updates for this site and others located in Putnam County.

Very truly yours,

James S. Hodgens

James S. Hodgens
Assistant Public Health Engineer

JSH:mbt
cc: Scott Radabaugh, NYS DEC-Albany

LETTER FROM JAMES S. HODGENS - PUTNAM COUNTY DEPARTMENT OF HEALTH
JUNE 15, 1988

COMMENT NO.	RESPONSE
Paragraph I	In the past, EPA collected soil samples from the residential yards adjacent to the former battery facility to determine whether off-site migration of heavy metal contamination from the site had occurred, and whether it posed an immediate health threat to the residents. These data, which indicate no immediate health threat, were discussed at a June 13, 1988 public meeting. Following the public meeting, the data and an explanation of it were forwarded to the residents whose yards were sampled.
Paragraph II	As a State-lead project until March 1986 and as a federal-lead project thereafter, numerous formal and informal public meetings have been held and public information notices have been distributed to the public. In addition, EPA staff have met with the Mayor of Cold Spring on several occasions. Two copies of the Fire Contingency Plan were hand-delivered to the clerk in the Village Town Hall in March 1988. One copy was intended for the Mayor and the other copy for the Fire Chief. Apparently, the plan was never forwarded to the Fire Chief by the Mayor's office.
Paragraph III	Since the as-built drawings for the vault are not available, it is impossible for the agency to accurately determine the useful life the vault. It is clear, however, that the existing vault does not meet the minimum requirements of a containment system as set forth by RCRA (see attached RCRA memo). Moreover, the limestone treatment process used on the vault sediments does not permanently nor significantly reduce the mobility of the metals. (see attached letter on the comparison of the chemical fixation process with the limestone treatment). Accordingly, the Agency believes that removal of the vault would be more protective of human health and the environment.
Paragraph IV	The groundwater underlying the site is not currently being utilized as a potable water supply. It is believed that the

contamination in the aquifer will naturally attenuate in 3-10 years. Institutional controls would be employed to prevent utilization of the aquifer until Maximum Contaminant Levels (MCLs) are attained. While the groundwater is not presently available as a potable water supply, once MCLs are attained, it will be available for use by the Village.

Paragraph V Alternatives for waste transport will be considered during the design phase of this project. The Agency recognizes that it is important to keep the public fully informed on all work to be done.

12 Constitution Drive
Cold Spring, New York
June 24, 1988

Magalie Beausjour
Project Manager, U.S. E.P.A.
Emergency and Remedial Response Division
26 Federal Plaza Rm. 23-102
New York, New York
Dear Ms. Beausjour,

I am writing this letter with deep concerns about the health related risks that can cause problems due to cadmium poisoning. My family lives at 12 Constitution Drive where the highest levels of cadmium were found in my back yard,67 PPM. In 1986 soil samples were taken from under my pear tree. We have eaten pears off this tree for more than 10 years and I have also had a vegtable garden in my yard for the past several years. A garden which has fed my family for decades. We are facing severe problems at our doorstep since cadmium poisoning is known to cause cancer. There are many dangers and risks at stake here. This is our home and has been for the past thirty years and it is a little too late to finally be made aware of someone elses irreversible mistakes which have been happening during and after the Sonotone Plant operations.

I have been told that when the bulldozers come in to clean up Sonotone that they will also be digging my yard , taking the soil, replacing it and reseeding it. I demand that this be put in writing and notice be sent to me prior to excavation.

My family myself and my neighbors have been over the years feeling ill effects on our health which may be attributed to the contamination in our general vicinity of Constitution Drive. Soil samples were taken in 1986. Why then was I not notified as soon as the EPA knew the levels at risk in these soil samples? I am extremely upset and demand more action to be taken on this account. My family along with hundreds of other signatures want your contaminated vault out of this area and put where it may not be a potential threat to American citizens. WE want Emergency Remedial Response.

Sincerly,
Richard, Mary, Andrew, and Mark Pidala

Richard Pidala
Andrew Pidala
Mary Pidala
Mark Pidala

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

Date August 4, 1988

From Denise Johnson dj
Regional Representative, ATSDR

Subject Health Consultation
Pidala Family, Marathon Battery
Cold Springs, New York

To Joel Singerman
Environmental Protection Agency
Region II

The Environmental Protection Agency (EPA) asked the Agency for Toxic Substances and Disease Registry (ATSDR) to comment on the health risk associated with the ingestion of pears grown in a backyard with a cadmium level of 67 parts per million (ppm) and the consumption of vegetables grown by the Pidala family. The Pidala residence is adjacent to the Marathon Battery NPL Site.

In two previous health consultations dated December 1, 1986 and March 8, 1988 from ATSDR to EPA, Region II, ATSDR stated that "the levels of cadmium do not pose an immediate health threat but recommended that residents not grow vegetables in the contaminated areas since cadmium is readily concentrated in vegetables and the ingestion of these vegetables may represent a potential threat". ATSDR recommended the removal of the higher levels of cadmium to alleviate this potential threat.

As mentioned previously, cadmium is readily taken up by plants with the greatest accumulation found in plant roots, followed by leafy dark green vegetables. Fruit from plants grown in cadmium contaminated soil have poor uptake of cadmium. The health risk associated with the ingestion of pears grown by the Pidala's is related to how often they eat pears.

Occasional ingestion of the pears is not likely to cause any health problem for the Pidala family. The potential for health problems to develop increases when large quantities of pears are consumed on a weekly basis for a long period of time. The World Health Organization has estimated that a cadmium uptake of 200 mg per day for 40 years may result in kidney problems.

ATSDR recommends the following:

1. Residents should not consume vegetables grown in soil containing level of cadmium greater that 20 ppm.
2. A composite sampling of the pears grown by the Pidala family would provide information that would enable ATSDR to more accurately assess the health risk associated with the ingestion of pears. At this time, the occasional consumption of pears is not likely to cause any health

Recommendations (continued):

2. (cont) problems, however weekly ingestion of large quantities of pears over time increase the potential for health problems to develop.

Questions should be directed to Bill Nelson or Denise Johnson at 212-264-7662 or 201-321-6657.

cc: Dr. David Mellard ATSDR/ERB
George Buynoski ATSDR/FOB
Steve Von Allmen ATSDR/HACA
Magalie Beausejour EPA
Eugene Dominach EPA

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II
26 FEDERAL PLAZA
NEW YORK NEW YORK 10278

AUG 31 1988

Mr. and Mrs. Richard A. Pidala
12 Constitution Drive
Cold Spring, N.Y. 10516

Dear Mr. and Mrs. Pidala:

This is response to your June 24, 1988 letter.

The Environmental Protection Agency requested that the Agency for Toxic Substances and Disease Registry (ATSDR) evaluate the health risk posed by the consumption of fruit from your pear tree, in light of the fact that 67 milligrams per kilogram of cadmium were detected in a soil sample collected from your backyard.

According to ATSDR, the health risk associated with the ingestion of pears grown in your backyard is related to how often the pears are consumed. Occasional ingestion of the pears is not likely to cause a health problem. The risk increases, however, when large quantities of pears are consumed on a weekly basis, for a long period of time.

Should you have any further questions, please feel free to contact me, or Magalie Beausejour of my staff at (212) 264-1336.

Sincerely yours,

Joel Singerman, Chief
Western New York Remedial Action Section

8/31

Columbia University in the City of New York | *New York, N.Y. 10027*

DEPARTMENT OF CHEMICAL ENGINEERING &
APPLIED CHEMISTRY

Terrace Building

July 1, 1988

Magalie Beausejour
Project Manager
US EPA, Emergency and Remedial Response Division #26
Federal Plaza Room 23-102
New York, NY 10278

Dear Sir:

This comment is addressed to you relative to the proposed remedial action plan at the Marathon Battery site at Cold Spring, New York.

I was appointed by the Office of the U.S. Attorney to act as independent technical expert in this matter, starting in 1970 and continuing for two or three years. My first responsibility was to help the plant comply with effluent requirements, which I did. Then I was in charge of the dredging of Foundry Cove and the construction of the vault. Subsequently, I was asked to help the company lower its effluent levels further, which I did and which I believe was successful.

After undertaking this responsibility I made myself thoroughly conversant with all of the technical literature pertinent to the subject, including the toxicity of cadmium, its role in the environment and means for its safe disposal. The spoils project involved many meetings with experts in the field and with members of the many regulatory agencies who were involved. At no time did I take any arbitrary action but obtained a concensus as to the dredging and entombment procedures. Having spent many days at the plant and on Foundry Cove, having personally taken and analyzed many samples, I regard myself as an expert on the subject.

I address myself to two subjects. First, the vault was built using the best of available technologies and since then the methods used have become State-of-the-art. The vault itself is good indefinitely. It was constructed on glacial till and the engineers who surveyed that site commented that "the Empire State Building could be put up here with confidence." There apparently is now an oppinion that the vault was meant to be secure for only 30 years. This must refer to the fence and the like because the vault itself, in my opinion, will be stable and safe indefinitely.

The document dated June '88 refers also to additional dredging in the Cove and some further work at the plant site. With regard to the Cove, the work done in '72 and '73 was believed, at that time, to be appropriate and permanent. I have asked for subsequent data but have as yet not received it. Unless some new information which is new and different is made available to me, I see no reason for further dredging of the Cove.

With regard to the plant site, here I have no comments at this time because the plant was operating when I was last there.

I write this as an independent citizen, not as an adviser to anyone and express my own, personal opinions.

Sincerely yours,

Harry P. Gregor

Harry P. Gregor
Professor Emeritus
Special Research Scientist

LETTER FROM HARRY P. GREGOR, JULY 1, 1988

COMMENT NO.	RESPONSE
Letter	Based upon a review of the available design documents describing the vault, as well as groundwater samples collected from monitoring wells surrounding the vault, EPA has no reason to believe that the contaminated sediments are not presently properly contained. However, should the vault's integrity be violated, the potential exists for contaminating the aquifer under the site. The September 1986 Record of Decision selected dredging of the contaminated sediments (>100 mg/kg cadmium) from East Foundry Cove Marsh. The fact that levels of cadmium ranging from the 100 mg/kg action level up to 171,000 mg/kg have been detected in these sediments justifies removal. The levels of cadmium currently present in the sediments present a public health and environmental threat.

ralph brill associates

6 July 1988

Ms. Maglie Beausejour
Project Manager
U.S. E.P.A.
Emergency and Remedial Response Division
26 Federal Plaza
Room 23-102
New York, New York 10278

re: Marathon Battery Site
Cold Spring, New York

Dear Ms. Beausejour:

I am a consultant to Dr. Jerome Spevack, Owner of the adjacent West Point Foundry Site in Cold Spring. This Property comprises about 90 Acres and incorporates 40+ Acres in Foundry Cove.

As we are not satisfied with any of the proposed solutions for Removing the Contaminations, we are Offering the following:

1- Set up Temporary Metals Recovery Plant on the West Point Foundry Property to Receive Dredged and Other Materials.
2- We will extract the Cadmium, Cobalt, etc. and Safely Store Them for Disposal or more likely Industrial Sale. The "Cleaned" Soils will be Replaced to where they were extracted from

This Undertaking will Save Money and will eliminate the need for a Major and Unsafe Trucking Operation.

Dr. Jerome Spevack was President of Deuterium Corp. and holds several Patents concerning the Proposed Recoveries.

Sincerely,

RALPH BRILL ASSOCIATES
Ralph Brill, President

RB:sj

box 200 garrison, new york 10524 tel. no. 914-265-3060

LETTER FROM RALPH BRILL ASSOCIATES - JULY 6, 1988

Extraction of cadmium from sediments, using acids or solvents, was evaluated in the Area I FS report. Acid extraction was eliminated in the initial screening because bench-scale tests showed that this technology could not achieve acceptable removal efficiencies. Solvent extraction of metals from sediments was also eliminated in the initial screening, because it is not a demonstrated and proven technology.

Any metal recovery scheme proposed for East Foundry Cove must be evaluated to determine if the plan is appropriate. This evaluation would require detailed information on the processes to be used and the cost of the recovery operation. In addition, the proposed recovery scheme must meet the remedial objectives, and comply with the Area I ROD.

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July 6, 1988

By Telecopy

Ms. Magalie Beausejour,
Project Manager
U.S. Environmental Protection Agency
Emergency and Remedial Response Division
26 Federal Plaza, Room 23-102
New York, New York 10278

Re: Marathon Battery Company Site,
Cold Spring, New York

Dear Ms. Beausejour:

In accordance with the extension of the comment period granted by Region II on June 23, 1988, enclosed please find copies of comments on the draft Remedial Investigation Feasibility Study (RI/FS) and Proposed Remedial Action Plan (PRAP) for Area II of the referenced site, provided by ERT and being submitted on behalf of Marathon Battery Company and Gould Inc. The companies look forward to discussing these comments with the agency.

Sincerely,

VINSON & ELKINS

Jeff Civins

Jeff Civins
Counsel for Marathon Battery
Company

JC:ab
Enclosures

cc: Ms. Beverly Kolenberg, EPA Region II
Ms. Lisa Ryan, U. S. Department of Justice
Mr. Michael C. Veysey, Gould Inc.

Document No. 7060-001-000

Comments of the Marathon Battery Company and Gould Inc. on the Remedial Investigation/Feasibility Study and Proposed Remedial Action Plan for Area II of the Marathon Battery Superfund Site Cold Spring, New York

Prepared for:

U.S. Environmental Protection Agency

July 1988

ERT
An ENSR Company

Document No. 7060-001-000

Comments of the Marathon Battery Company and Gould Inc. on the Remedial Investigation/Feasibility Study and Proposed Remedial Action Plan for Area II of the Marathon Battery Superfund Site
Cold Spring, New York

Prepared for:

U.S. Environmental Protection Agency

July 1988

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1. INTRODUCTION

Marathon and Gould (the "Companies") believe that the proposed remedial actions of Region II of the United States Environmental Protection Agency ("EPA") concerning Area II of the Foundry Cove Superfund Site, in general, are technically sound, protective of human health and the environment, and cost-effective. In particular, the companies support the proposed recommendation of no action for ground water and the vault, including provisions for ground-water monitoring. The Companies also support building decontamination and limited soil remediation. The Companies, however, do have specific concerns with the proposal, primarily with regard to the criteria for soil cleanup, and believe that these criteria should be reevaluated. The reasoning of the Companies is explained in these comments, which the Companies submit for EPA's consideration. These comments are based upon a review of the following three documents:

- Supplemental Remedial Investigation Report, Marathon Battery Company Site (Former Battery Plant Grounds), Village of Cold Spring, Putnam County, New York. May 1988 (RI).
- Draft Supplemental Feasibility Study Report, Marathon Battery Company Site (Former Battery Plant Grounds), Village of Cold Spring, Putnam County, New York. May 1988 (FS)
- Proposed Remedial Action Plan, Marathon Battery Company Site, Putnam County, New York, June 1988. (PRAP)

2. GROUND WATER

After reviewing the RI, FS, PRAP and pertinent references, the Companies concur with the conclusion that no action (Alternative GW-1) is appropriate for ground water. The reasoning of the Companies, however, differs from that expressed in the RI/FS. This difference is significant in that it affects other portions of the remedial action plan, such as the proposed remediation of VOC-contaminated soil. In the discussion below, the Companies elaborate, focusing on the following points:

- Discharge to Foundry Cove
- Relationship between volatile organic compounds (VOCs) in groundwater and in soil
- Monitoring program

2.1 Discharge to Foundry Cove

The calculation of the flux of VOC (specifically trichloroethylene, or TCE) in ground water into East Foundry Cove was based on several assumptions that the Companies believe are incorrect.

- The calculation uses Darcy's equation, which relates the cross-sectional area of an aquifer to the discharge rate (or flow) through the aquifer (EBASCO 1988a, page 4-28). The withdrawal rate from the pumping test was input into this equation rather than the natural discharge rate (or flow) through the aquifer. As a result, the calculation does not represent natural conditions in the aquifer, and the estimated cross-sectional area is in error. If instead the aquifer cross-sectional area is calculated using an estimate of the saturated thickness and the width of the contaminated plume at the discharge to East Foundry Cove, a flux of contaminated ground water of approximately 6750 ft^3/day is obtained (as opposed to the 179,000 ft^3/day calculated in the RI).

- The ground-water flux for the entire aquifer presumably was multiplied by peak TCE concentrations at the site to obtain the TCE flux into the cove. The average plume concentrations at the point that the plume enters the cove is more representative of existing site conditions and should be used in the calculation rather than TCE concentrations at the site.

Since no off-site monitoring wells are available for data on groundwater quality at the discharge point, data from the most downgradient on-site well should be used as an estimate of the discharge concentration, rather than peak concentrations measured upgradient. To obtain a more realistic estimate, based on site-specific conditions, the effects of retardation also should be taken into account. Using a TCE concentration of 13 ppb and the calculated retardation factor of 7.3[1], the mass flux of the TCE into East Foundry Cove is estimated at 124 grams/year, a value considerably less than the 536 grams/day or 195,640 grams/year calculated in the RI. With a mass flux of 124 gms/day of TCE and a total flow in the Cove of 64 million gallons per day (32 million gallons per tidal flux as cited in the RI), the concentration of TCE in the Cove is estimated at 1.4 nanograms/liter (1.4×10^{-9} grams/liter). The lower mass flux translates to an even lower environmental impact to the East Foundry Cove than calculated in the RI, though a longer time is required to remove contaminants from the site by natural flushing.

As a result of the assumptions of the RI, extremely large fluxes of ground-water and TCE entering the cove were calculated. It the RI-estimated ground-water flux on the order of 2 cfs were correct, all of the TCE would have been flushed from the site in a very short period of time and the TCE should not continue to be present in site soil. Data reported from the RI indicate that this is not the case[2].

In summary, although the flux of ground-water and the mass transfer of associated TCE into East Foundry Cove were overestimated, the conclusion reached in the RI, that the flux of contaminated ground water to the cove does not produce a significant environmental impact, remains the same.

2.2 Relationship Between VOCs in Ground Water and in Soil

VOC-contaminated soils on the Site do not appear to be a significant source of ground-water contamination. After carefully considering the derivation of remediation goals for soils and ground water, the model for contaminant distribution, and the analytical data presented in the RI/FS Reports, the Companies believe that a conclusion that no action is appropriate for ground water compels a conclusion that no action is also appropriate for VOC-contaminated soils. Each step of this reasoning is presented below.

The remediation goals for ground water formed the basis for remediation goals for soil. The FS derives remediation goals for VOCs in ground water by considering the potential for contamination of ground water as VOCs leach from soil[3]. The FS Report states that

> "...estimates of the remediation levels for TCE, PCE or chloroform in soil are based upon the requirement for non-detectable groundwater concentrations. Therefore, it is assumed that non-detectable concentrations would be the remediation levels for TCE, and PCE and chloroform in soil." (EBASCO 1988b, page 1-24)

There are several flaws in this statement and in supporting arguments elsewhere in the RI/FS.

- o Non-detectable ground water concentrations are described in the quoted statement as the remediation goal. The proposed New York State MCLs, however, have been designated as remediation goals for ground water. Those concentrations are detectable; in fact, the RI notes on page 5-24 that the detection limit for TCE was 5 ug/l, which is the MCL.

- o Detectable concentrations of VOCs in soil will permit achievement of remediation goals for ground water. The statement that soil concentrations must be nondetectable is not supported in the FS; in fact i is contradicted both by analytical data presented in the RI, and by the related discussions of contaminant transport in ground water.

  - Data on chloroform concentrations presented in the RI illustrate the point. Table 5-6 indicates that no ground-water sample contains chloroform at or approaching the remediation goal of 100 ug/l (the MCL), although chloroform has been found in saturated soil (in contact with ground water) at concentrations up to 120 ug/kg (EBASCO 1988a, Table 5-3). Chloroform in saturated soil should be in equilibrium with the ground water. The ground water in contact with such soil should contain the maximum possible concentration of chloroform. These data indicate that it is not necessary to achieve non-detectable levels of chloroform in the soil to achieve the remediation goal for chloroform in ground water.

  - Theoretical arguments elsewhere in the RI/FS should have been considered in the derivation of the remediation goal for VOCs in soil. Section 5.3 of the RI describes a model for the distribution of organic contaminants between soil and ground water[4]. However, it does not appear that this or any other model of contaminant distribution was used to derive the "nondetectable" remediation goal for VOCs in soil.

  - The data from the RI also indicate that an off-site source of VOCs may affect ground-water quality on the site. A split-sample from upgradient well 3S obtained during the first round of ground-water sampling contained 2.7 ug/l trichloroethylene (ERT data; not detected in the split sample collected for EPA). Second-round samples from that well contained 2 ug/l (EBASCO 1988a, page 5-25) and 3.7 ug/l (ERT data). These data indicate that ground water flowing onto the site may already be contaminated.

  - Given the aquifer transmissivity and the low levels of volatile organic compounds found in the ground water at the site, it would be possible to select locations for water supply wells near the site boundaries where the ground water produced from the wells would not contain contaminants above the MCLs. This conclusion supports the no-action alternatives for both VOC-contaminated soils and ground water.

Qualitative analyses of the data from the RI indicate that soil remediation does not appear to be warranted.

- Only very low levels of TCE, PCE and chloroform were found in the soil (parts per billion range), and those only in certain few samples. Those isolated data points do not reliably indicate that the soils targeted for remediation act as a significant source of ground-water contamination.
- The levels of contaminants in ground water are generally decreasing over time. The RI states that: "...it appears likely that a decrease in groundwater contamination by volatile organics is occurring in the aquifer" (EBASCO 1988a, page 5-27). This statement suggests that soils are serving as only a minor source of VOC contamination in the ground water, if at all. If no action is currently required for ground water, and the soils serve as a negligible source of ground-water contamination, then no action is appropriate for VOC-contaminated soils.

In summary:

- The remediation goal for ground water, if it is eventually to be used for potable water, is to achieve MCLs - not to achieve undetectable levels of VOCs;
- It is not necessary to achieve nondetectable levels of VOCs in soil in order to reach remediation goals for ground water; and
- Existing data do not suggest that soils are serving as a source of ground-water contamination.

Therefore, remedial action on VOC-containing soils is not justified based upon remedial goals for, and present conditions in, the ground water.

2.3 Ground-Water Monitoring

The PRAP describes the no-action alternative as including ground-water monitoring of existing monitoring wells as well as additional bedrock monitoring wells. The latter were not included in either the description of the no-action alternative or the cost estimate in the FS. In the Feasibility Study Report (EBASCO 1988b, page 4-2), the monitoring well network for the no action alternative is described as "the existing six monitoring wells." Neither a list nor a map of the monitoring well locations is provided. Presumably, the six wells selected for the monitoring program are shallow and intermediate-depth wells 2S, 3S, 4I, 5S, 6S and 7S. The Companies agree with the PRAP that additional monitoring should be conducted in the bedrock, since it is likely that if off-site water supply wells were installed, they would be installed in the bedrock rather than the overburden. Existing bedrock well 4D should be monitored, as well as an additional well installed in the bedrock downgradient of shallow well 7S. Presumably, monitoring of the wells adjacent to the vault (wells V1 through V5) would also be conducted. If this is not the case, then at a minimum well V4 or a shallow well installed at the southeastern boundary of the site should be monitored to provide downgradient water quality data.

3. BUILDING DECONTAMINATION/SOIL EXCAVATION/FIXATION/ ENHANCED VOLATILIZATION/OFF-SITE DISPOSAL

The comments in this section concern the proposed alternative (S4) for remediation of dust in the building and soils on site. While remedial actions are necessary to prevent exposure to and migration of contaminants, several of the components of the proposed remedial action plan are not warranted. The reasoning which led to this conclusion is discussed below and alternatives are proposed where appropriate.

3.1 Soil Excavation

3.1.1 VOC-Contaminated Soils

As discussed in the previous section, VOC-containing soils need not be excavated and treated to protect human health and the environment. RI data do not indicate that the soil serves as a significant source of ground-water contamination. In neither case is remedial action necessary. An action alternative for VOC-contaminated soil is inconsistent with a no action recommendation for ground water.

3.1.2 Cadmium-Contaminated Soils

The Companies agree that cadmium, rather than nickel or cobalt, should be the focus of remedial actions for soil. The Companies, however, have several concerns with the derivation of remediation goals for cadmium and the resulting remedial-action proposal.

Two goals are defined in the FS for remediation of cadmium in soil:

> "Prevent soils contaminated with cadmium above 100 ppm from erosion by stormwater runoff and deposition into East Foundry Cove after remediation" (EBASCO 1988b, page 1-24); and

> "Prevent cadmium contaminated soils and dust from being resuspended and inhaled by persons on and off-site, at concentrations above 50 mg/kg". (EBASCO 1988b, page 1-23)

ATSDR additionally has suggested a remediation goal of 20 mg/kg cadmium based upon vegetable ingestion. Each of these goals is discussed below.

100 ppm Criterion for Cadmium

The first remediation goal, relating to stormwater runoff, is derived from the Record of Decision for Area I (EBASCO 1988b, page 1-23). As noted in previous comments on the RI/FS for Area I (ERT 1986), the 100 mg/kg target level for cadmium in the sediments was without both record support and scientific justification. Furthermore, only a very limited quantity of on-site soils contain high cadmium concentrations and there is no evidence to suggest that significant erosion of those soils has or may occur. The RI/FS does not demonstrate any link between a small amount of runoff from the site and the total concentration of cadmium in sediments in the cove.

50 ppm Criterion for Cadmium

The second remediation goal is to prevent the resuspension and inhalation of soil which contains cadmium above 50 mg/kg. The derivation of this level in the Endangerment Assessment (EA) contained several unjustified assumptions. In some cases, for example, recent scientific information suggests the use of other assumptions and exposure factors.

- The choice for a target risk level of $1x10^{-6}$ was not explained. The risk assessment concluded that 56.3 mg/kg cadmium in soil should be acceptable, assuming that the goal is to achieve the $1x10^{-6}$ risk level. No other levels of risk are considered, although the EA acknowledges that risks in the range of $1x10^{-4}$ to $1x10^{-7}$ are acceptable.

- The USEPA has indicated in its Superfund risk assessment guidance documents that cleanup levels based on excess lifetime cancer risks of between $1x10^{-4}$ to $1x10^{-7}$ are acceptable (EPA, 1986). Recent research by an independent panel illuminates that guidance. Based on a survey of 132 federal regulatory decisions, including more than 100 decisions by the USEPA, it appears that the federal government has not acted to reduce individual lifetime cancer risks when those risks are less than about $1x10^{-6}$ even if the whole of United States population is exposed. The survey further shows that in general, the acceptable risk is population-dependent. For smaller populations, such as at this site, regulatory agencies have never acted when individual excess lifetime cancer risks are $1x10^{-4}$ or smaller (Travis et al. 1987). A concentration of cadmium in soil of about 5600 mg/kg corresponds to a $1x10^{-4}$ risk, using the assumptions of the EA (see comments below on those assumptions). That concentration is 100 times higher than the level derived in the EA.

- The cleanup level is based on the excess lifetime cancer risk associated with inhalation of cadmium-bearing soils suspended in the air on or in the vicinity of the site[5]. Several assumptions used in estimating the amount of cadmium in the air and the dispersion of particulates in air lead to unrealistic overestimates of exposure and risk and therefore to a much lower cleanup level than is justified. The assumptions of particular concern are discussed below.[6]

    - The risk assessment assumed that all of the particulates in the air originate from the site. This assumption is both incorrect and inappropriate. Only a fraction of the particulates in the air in the vicinity of the site will be of site origin, since there are many other sources of particulates in the area. The contribution of these other sources must be accounted for when deriving a clean-up level. In addition, the site is largely covered with vegetation or pavement. It is also relatively small. Both of these factors would suggest that any contribution of the site soils to total particulates in the air will also be small.

    - The risk assessment does not account for any dispersion of particulates. Dispersion occurs and must be accounted for. Any risk assessment not accounting for dispersion will seriously and unrealistically overestimate exposure and risks and cannot be considered to be scientifically valid.

  - The endangerment assessment assumes that all of the particulates in the air that a person breathes reach the lungs. This assumption, too is incorrect. Larger particulates are trapped in the nose and throat or are removed from the lungs by ciliary action and are ingested. Typically only about 50% of total suspended particulates in air are inhalable (EPA 1981; Spengler and Thurston 1983).

  - The risk assessment assumes that all of the cadmium adsorbed onto particulates is available to the body and therefore contributes to the predicted excess lifetime cancer risk. This assumption also is incorrect. The absorption and toxicity of cadmium depends upon particle size, the solubility of the cadmium compounds and other factors (EPA 1981).

- The exposure assumptions relating to frequency of exposure used in the risk assessment are not realistic because they do not differentiate between people who are onsite, such as workers or trespassers, and people who are offsite. The EA assumes that all exposed people are on site (or exposed to on-site conditions). That is impossible for two reasons. First, residents living near the site spend most if not all of their time offsite and therefore are not exposed continually to on-site concentrations. Second, the off-site concentrations of airborne cadmium-bearing soils would be much lower than the concentration on site. Airborne particulates would disperse as they were blown off site. As stated previously, a risk assessment must account for the effects of dispersion.

  Further, the exposure assessment assumes that people exposed to the dust are on site and inhale the highest possible level of cadmium in the air for 24 hours per day for seventy years. This assumption is totally incorrect and invalid. It is unlikely that anyone would remain at the same location for 24 hours per day, let alone for over 600,000 hours consecutively, as the EA assumes. Workers are onsite about 8 hours per day, not 24. Trespassers visit the site even less frequently and for much shorter durations.

Use of realistic exposure assumptions will greatly reduce the exposures and risks predicted by the risk assessment. The calculated risk would decrease by an order of magnitude or more. A consequence of this would be a higher, but scientifically more valid clean up level.

- The EA cites regulatory limits for airborne cadmium dust (EBASCO 1988a, page 7-15). The lowest of these, recommended by the American Conference of Government Industrial Hygenists (ACGIH), is 0.05 mg/m^3. That concentration may be related to a soil concentration protective of exposed workers. Using the assumptions of the EA[7], workers could be safely exposed to soil which contained up to 100% cadmium. The value calculated from the ACGIH exceeds the EA criterion for worker protection by five orders of magnitude.

- The risks estimated in the EA are based on the maximum measured concentrations of cadmium in soil, and the clean up level is presented as a maximum value not to be exceeded. Neither of these approaches is realistic or justified. A person does not ingest or inhale soil only from the area with the highest level of cadmium. A person visits different areas of the site while on site. Many of the areas have very low concentrations of cadmium, a few will have higher concentrations and only one will have the highest concentration. Similarly, the area of highest concentration is not the only source of particulates in air, as the risk assessment assumes. A more appropriate and justifiable assumption is that people are exposed to an average concentration of cadmium on the site. Therefore, the cleanup level should also be based on an average concentration rather than the maximum concentration.

- The model used to describe cadmium leaching does not appear to be site-specific. The derivation of the cleanup goal also considered the potential for significant groundwater contamination to result from residual cadmium. While this approach generally is appropriate, it is inappropriate not to tailor the methods used in the analysis to the site. The EA cites literature values of soil/water partition coefficients (K_d) for cadmium in the range from 300 to 30,000 l/kg. Based upon these values, and considering an acceptable concentration of cadmium in the ground water to be 10 ug/l, an acceptable concentration of residual cadmium between 3 and 300 mg/kg was calculated. The EA then declared that "If the best estimate K_d of 3,000 l/mg is used, then acceptable soil concentrations would be 30 mg/kg of cadmium" (EBASCO 1988a, page 7-33).

Relating groundwater concentrations to soil concentrations of metals via literature values of K_d is an oversimplification. The ability of a soil to retain or leach metals is very site-specific and depends upon the physicochemical characteristics of the system. Key variables include (Adriano 1986):

- soil pH;
- cation exchange capacity of the soil;
- presence of other chemical compounds in the soil which may react with the metal by redox reaction, precipitation, or chelation to change the form, solubility, and/or speciation of a metal;
- amount or pH of infiltration which can dissolve and transport metal ions.

No citations or explanations are given in the text of the EA as to why the "best estimate K_d" for the soils at this site is 3,000 l/mg. Without a solid technical justification for the derivation, the "acceptable soil concentration" of 30 mg/kg is scientifically unsupported.

- Ground-water monitoring data in Table 5-7 of the RI appear to contradict the model. Of 14 samples (from 13 locations), only one sample contained cadmium at a detectable level. Even that sample, at 6 ug/l, is below the cleanup criterion of 10 ug/l. These data indicate that even at present levels of Cd in the soil, very little is leaching to groundwater.

- The final step in the derivation of the cleanup criterion is unexplained. At the conclusion of the analysis of the effects and transport of cadmium, the EA states with no justification that "For the purposes of this investigation, 50 mg/kg is the concentration of cadmium that would totally protect workers and nearby residents. This concentration was used to estimate the volume of soils requiring remediation in the Area II Feasibility Study. A soil cadmium concentration of 50 mg/kg provides a cancer risk of 0.89×10^{-6}" (EBASCO 1988a, page 7-33). No explanation is given for lowering the soil remediation goal from the previously risk-derived level of 56.3 mg/kg. As elsewhere, no explanation is given for choosing the particular risk target. The previously-derived level of 56.3 mg/kg would have been more logically rounded up to 60 mg/kg than rounded down to 50 mg/kg; even rounding up to 100 mg/kg would only imply a potential risk of 1.78×10^{-6} (using the conservative assumptions of the EA), certainly not an unreasonable level.

20 ppm - ATSDR's Vegetable-Ingestion Based Criterion

The ATSDR has recommended a clean up level for cadmium in residential soils of 20 ppm. This recommendation was documented in a memorandum from William Nelson, ATSDR Regional Representative, to Joel Singerman of U.S. EPA Region II, entitled "Marathon Battery Site Consultation", dated June 10, 1988. Copies of the memorandum were provided to the Companies by EPA. Neither the 20 ppm level nor its derivation were included in the risk assessment presented in the RI Report (EBASCO 1988a). To date, that derivation has not been made available. It is therefore not possible to provide detailed comments on ATSDR's recommendation. The Companies note, however, that incorporating human exposure via the food chain into an endangerment assessment requires additional assumptions. The amount of a contaminant reaching the foodstuff must be estimated in addition to the amount of the foodstuff that is eaten by a person. In almost all cases these assumptions have even greater uncertainty than those used in estimating direct exposures because humans have been studied in much greater detail than individual species of plants and animals. From past experience, the areas that have great uncertainty and therefore can make significant contributions to overestimates of risk include: failure to consider site-specific soil parameters; failure to account for site-specific foodstuff ingestion rates; the bioavailability of a contaminant in soil to plants; the bioavailability of a contaminant in plants to humans; and plant specific differences in uptake of a contaminant. These and other parameters need careful consideration when assessing the risks associated with ingestion of vegetables.

Before selecting a cleanup level for remedial action, the Companies believe it appropriate that there be an adequate scientific basis. This the RI does not provide. If documentation is provided as to how the clean up level was derived, the Companies would welcome the opportunity to review it and submit comments on the proposed 20 ppm clean up level.

3.1.3 Alternative Remedial Proposal

Regardless of the specific numerical criteria for cadmium in soil, the remediation goal is to protect human health and the environment from the potential effects of exposure to eroded suspended soils. That goal may be met by a combination of remedial actions which are both environmentally sound and more cost-effective than those proposed in the PRAP. In particular, the Companies propose the following remedial actions for metal-contaminated soil:

(1) excavation of the top six inches of soil in all unpaved areas;

(2) excavation of "hot spots" (defined as 1000 mg/kg or more of cadmium or nickel, i.e. locations 1,2,3 and 4) to appropriate depths;

(3) treatment either on- or off-site, whichever is more practical and cost-effective; and

(4) disposal off-site.

Excavation of hot spots plus a surficial six-inch layer across the unpaved areas of the site would remove approximately 73% of the known mass of cadmium in soil. This remedial action would decrease the potential for exposure to and migration of cadmium-contaminated soils, and permanently and significantly decrease the volume, toxicity and mobility of cadmium on site. As stated previously, remediation of VOC - contaminated soils is not necessary to protect public health and the environment.

Recent EPA guidance supports this common-sense approach:

> "For sites with discrete hot spots or areas of more concentrated contamination, however, it may be more useful to define areas and volumes for remediation on the basis of the site-specific relationship of volume (or area) to contaminant levels. Therefore, when areas or volumes of media are defined on the basis of site-specific considerations such as volume versus concentration relationships, the volume or area addressed by the alternative should be reviewed with respect to the remedial action objectives to ensure that alternatives can be assembled to, as a minimum, reduce exposure to protective levels." (EPA, 1988c)

It is appropriate to base soil remediation for the Marathon Battery Site upon the relationship between volume of soil and total mass of cadmium. Partial excavation to remove the bulk of cadmium, followed by paving or capping where appropriate, would permanently and significantly reduce the volume, toxicity and mobility of cadmium at the site in a more cost-effective manner than the proposed alternative. The FS failed even to consider this option. A comparison of cost estimates for this option with the PRAP indicates that the PRAP option is three to four times more expensive without affording any additional degree of environmental or health protection. In addition, the transportation-related risks of the PRAP soil cleanup option are fourfold lower than those associated with this alternative remedial proposal. Treatment, disposal and capping are discussed in Section 3.3 of these comments.

3.2 Building Decontamination

Decontamination of the former manufacturing facility is an acceptable remedial alternative. Two points are unclear, however. First, the FS Report does not explain the estimate of

110 cy of dust which must be removed and treated. Second, the purpose for activities outlined in the Supplement to the Proposed Remedial Action Plan is unclear.

The assessment of potential risks from a fire in the building (EBASCO 1988a, pages 7-27 and 7-36) indicated that it would not pose a significant risk from exposure to cadmium. As a result, the remedial objectives did not incorporate that scenario. The Proposed Remedial Action Plan (EPA 1988a), however, includes the repair of the sprinkler and heating systems in the building "to minimize the risk to public health and the environment should a fire occur in the facility". This proposal was not considered in the Feasibility Study, and its inclusion in the PRAP is confusing. If a fire were to occur before cadmium-containing dust was removed from the building, the risk assessment demonstrated that it would not cause a significant risk to public health. If a fire occurred after dust removal, there would be no "risk to public health and the environment" from a release of a hazardous substance. Therefore, the repair of the sprinkler and heating systems is not supported by the RI/FS.

3.3 Treatment and Disposal of Soil/Dust

Treatment of soil and dust via solidification may occur on-site or off-site. Each location has advantages and disadvantages.

On-site treatment may be cost-effective for large volumes of soil. However, on-site treatment would present short-term local risks to public health, an important consideration given public concern over the site.

Off-site treatment was not fully evaluated in the FS. For relatively small volumes of soil, off-site treatment at a licensed facility may be more cost-effective than on-site treatment. Furthermore, off-site treatment minimizes the potential for local exposure to excavated soils. Off-site treatment also minimizes the truck traffic from the site, because the volume of soil is expected to double with treatment.

The FS Report specifies that treated soil and dust will be disposed of in a RCRA landfill and the costs of disposal were estimated accordingly. This component of the PRAP is inconsistent with the Record of Decision (ROD) signed for Area 1 on September 30, 1986. That ROD specifies that fixated sediments will be trucked to a sanitary landfill for disposal. Because the matrices, contaminants, and treatment processes for sediments and soil/dust are similar, it is illogical that treated soils and treated sediments will be disposed of differently. Assuming that solidification renders soils nonhazardous, as was demonstrated by bench-scale tests in the RI/FS, the treated material need not be disposed of in a hazardous waste landfill. Unnecessary disposal in a RCRA landfill would incur unwarranted cost. If no sanitary landfill will accept either the fixated sediments or soil/dust the cost estimates in the Area II FS Report will be accurate but the costs of Area I remediation will have been seriously underestimated, by as much as 350 per cent.

4. VAULT

The companies agree that no action (Alternative V-1) is appropriate for the vault. The existing combination of chemical fixation and physical containment prevents the release of contaminants to the environment. There has been some representation that the design life of the vault is only thirty years. There is no factual basis for that representation. The vault was designed to be permanent (Gregor, 1974):

- A geological survey of the area (performed before the vault was constructed) showed the area to be extremely stable. The test laboratory described the area as being so geologically stable that "buildings as large as the Empire State Building could be built there".
- The vault was excavated to fifteen feet below the ground surface. The bottom of the vault is well above the ground-water table, which lies about thirty feet below the surface. Thus, the sediments in the vault cannot contact ground water.
- The excavation was first lined with two inches of asphalt for sealing and water proofing. Then a one-foot layer of blue Putnam clay was laid over the asphalt. This clay layer was intended to trap any cadmium which might leach out of the sediments. The clay has a high affinity for cadmium (also see EPA, 1978).
- Disposal of the dredged sediments was planned to minimize leachate generation. The dredge spoils were dried to the extent possible before placement in the vault. The vault cover has kept them dry, and vent pipes were installed in the vault which could carry off evaporating water.
- The cadmium in the sediments was initially barely soluble. Tests on the sediments showed that prolonged shaking with river or ground-water released but 0.03 to 0.08 mg/l cadmium into the water. To make the cadmium even less soluble, powdered limestone was added to the sediments during disposal.

Should the vault ever be breached, the crushed limestone mixed with the sediments provides further insurance that metals will not leach from the sediments. The volume of limestone added to the sediments should theoretically provide over 1,000 years of stabilization, even subject to acid rain of pH 4 (Francis, 1984).

- The sediments were covered with a four-layer cap to protect them from infiltration and erosion. The cap consists of: (1) a layer of gravel, to trap and vent evolving gases; (2) compacted clay; (3) asphalt; and (4) earth, graded and seeded. The earthen cover is deep enough to protect the other layers from frost. This design should ensure a stable, effective, long-lasting cover.

With proper maintenance, the physical containment should last indefinitely (Dr. H. Gregor, personal communication).

The purpose and extent of long-term monitoring of vegetation and subsurface soils are unclear. The FS Report states that "[t]he monitoring program would include inspection of the cap as well as sampling and testing of groundwater using the existing monitoring wells once every month for a period of 30 years.... Maintenance is required to remove deep-rooted vegetation from the cap." (EBASCO 1988b, page 4-18). However, the PRAP presents a different monitoring plan: "[a] long-term groundwater monitoring program and periodic inspection of the vault capping would be included in this alternative in order to check the integrity of the vault. This maintenance program would also involve sampling of soil underneath the vault and vegetation on top of the vault."

Several points are of concern:

- Sampling of vegetation and sub-vault soils was not planned during the FS and was presumably added to the PRAP as an afterthought.

- Vegetation samples will be meaningless if, as the FS Report states, deep-rooted vegetation will be periodically removed from the top of the vault. The roots of the remaining vegetation would not penetrate through several feet of earth and the remaining layers of the cap to reach the entombed sediments.

- The frequency, extent and methods for sampling soil beneath the vault are not specified. It is unlikely that such sampling would provide meaningful information. Random samples of soil beneath the vault would only indicate whether or not the vault had suffered catestrophic failure in the vicinity of the specific sampling point(s). These "hit or miss" soil samples would not provide any more useful information than routine ground-water monitoring. Furthermore, these samples would be difficult to obtain, and sample collection might even damage the containment structure.

As a result of these concerns, the Companies propose that routine monitoring of the vault area be limited to ground-water monitoring. Sampling and analysis of subvault soils and surface vegetation would incur additional cost without providing useful information.

FOOTNOTES

1. (page 2-2)

The retardation factor (R) can be calculated using the equation

$$R = 1 + (P_b)(f)(K_{oc})/n$$

where P_b (soil bulk density) = 1.5 gm/cm^3; f (fraction of organic carbon) = 0.01; K_{oc} (organic carbon distribution coefficient) = 126; and n (porosity) = 0.3.

2. (page 2-2)

From the available soil and ground-water data, it can be estimated that approximately 6,000 gms of TCE are associated with the contaminant plume (in the soil and ground-water). If the RI's estimate of the contaminant flux from the site were accurate, the contaminants would have been flushed from the site in less than a month.

3. (page 2-3)

The EA and the FS assume several contradictory bases for the derivation of remediation goals for groundwater. The resultant discussions are confusing and misleading and misdirected the derivation of remediation goals for soil. "Acceptable risk" is variously defined by the 10^{-6} risk level, zero risk, nondetectable concentrations of contaminants, or the risk associated with either promulgated or proposed MCLs.

The FS refers to "The nondetectable remediation level" (page 1-25, third full paragraph) and the EA contains a weak justification for remediation to the zero or nondetectable level for certain contaminants. Of most concern is the discussion in section 7.6.1 of the EA (EBASCO 1988a, page 7-33). That discussion contains both technical and logical errors.

The context of that discussion is that acceptable levels of organic compounds may be back-calculated from exposure assumptions for a selected level of risk. The selected level of risk is not clearly stated or justified in the EA. (It appears from the calculations that the selected level of risk from exposure to all groundwater constituents was the 10^{-6} risk level). As a result of these calculations, the EA states that

"Acceptable water concentrations are: trichloroethylene, 3 ug/l; chloroform, 0 ug/l; tetrachloroethene, 0 ug/l; 1,1,1-trichloroethane, 0 ug/l; and 1,2-dichloroethane, 0 ug/l. Since these levels are below normal detection limits, it is anticipated that a non-detectable concentration in the groundwater would adequately protect human health". (EBASCO 1988a, page 7-33)

This statement contains several errors or unexplained points.

- One of the listed compounds, 1,1,1-trichloroethane (TCA), is neither a known or a suspected carcinogen. Neither the Public Health Risk Evaluation Database (EPA, 1988b) nor the Superfund Public Health Evaluation Manual (EPA, 1986) characterize this compound as a carcinogen. Because TCA is not a carcinogen, the potential health effects should be gauged from the verified Reference Dose (RFD) rather than a carcinogenic potency factor. It is interesting to note that the acceptable level of TCA in drinking water calculated from the RFD is 3150 ug/l (EPA, 1988b).
- The allotment of risk between the ground-water constituents is not explained. A potential risk of approximately 9.43×10^{-7} was assigned to trichloroethylene and zero risk to the remaining potential carcinogens. The reasons for this risk distribution were not presented in the EA.
- The wording of the quoted statement appears to contradict the findings by the US EPA and its New York State counterpart that non-zero MCLs are acceptable and fully protective of human health for the listed constituents. Furthermore, although the EA refers to "non-detectable concentration in the groundwater", MCLs are neither undetectable, nor must they necessarily be met in the ground water to protect human health. Attainment of MCLs in potable water at the point of exposure will protect human health.

4. (page 2-4)

Section 5-3 of the RI describes a model which attempts to quantify the potential leaching of VOCs from soil to ground water using partition coefficients. While the basic premise is sound, several components of the model and the resulting conclusions are questionable.

- The model is based upon very little data, and the calculations presented in the RI (EBASCO 1988a, pages 5-31 and 5-32) appear to be based upon worst-case concentrations. These concentrations do not represent the larger mass of soil.

- The calculations rely on an unexplained value for total organic carbon (TOC) in soil. It appears that the given value is not site-specific. (The RI cites Brady, 1974 as a reference for the TOC value; however, that reference is not listed in the References section. Instead, there is a reference to Bradley, 1984 IN: The Nature and Property of Soils.)

- The distribution coefficient, K_d, was used incorrectly to estimate contaminant concentrations in the ground water. The concentration in the ground water is equal to the concentration in the soil _divided_ by the distribution coefficient, rather than the soil concentration _multiplied_ by the distribution coefficient as shown in the RI (EBASCO 1988a, page 5-31). Therefore, as an example, the concentration of chloroform in the ground water related to the maximum soil contamination should be estimated at 125 to 273 ug/l, rather than 52.8 to 115 ug/l (EBASCO 1988a, page 5-34).

- Regardless of which calculation method is used, the existing ground-water data contradict the model. For example, chloroform was found in only three wells, and at far lower concentrations than predicted: 1 ug/l (5S), 11 ug/l (7SA), and 19 ug/l (V1). (Data from RI Table 5-6.) PCE was predicted to range between 28.5 and 34.5 ug/l in the ground water as a result of soil contamination, yet it was found in only one well during one round of ground water sampling, at 2.4 ug/l (by comparison, the MCL is 5 ug/l). No attempt was made in the RI/FS to reconcile the model predictions with the existing ground water data.

5. (page 3-3)

The risk assessment also estimates the potential adverse health effects associated with inadvertently ingesting cadmium containing soils and dusts. Many assumptions used in evaluating the soil and dust ingestion scenario also lead to overestimation of exposure and risks. For example, the risk assessment assumed 420 milligrams of soil per day is ingested by humans. More recent evidence indicates that between 50 and 100 milligrams per day is more realistic (Clausing et al.

1987). The risk assessment also assumes that a recreational user (or tresspasser) goes on the site 2 days per week, five months per year, for 70 years. Given that the site is fenced and that it contains nothing that would encourage repeated lifelong visits by a recreational user, the estimates used in the risk assessment are not appropriate. Workers are assumed to be on site for 48 weeks per year for 50 years per lifetime. These too are overestimates. 48 weeks per year does not account for a worker being sick, or for all possible holidays, or for increased vacation time as the worker gains seniority (which must happen if the worker remains with the company for 50 years, as assumed by the risk assessment). Assuming that a worker remains at one company for fifty years leads to an overestimate of risk and is also unrealistic. One need not look further than the site's ownership history to demonstrate that point.

6. (page 3-3)

In addition to the assumptions of concern, the risk assessment appears to contain calculation or transcription errors:

- The concentration ranges given in the text (EBASCO 1988a, page 7-5) do not agree with those stated in Table 7-2, the table from which all of the calculations were derived. The origin of the values given in the table should be defined.
- Calculating the risk from volatile "organics" using the data given in the table (Table 7-2) gives risks which are different from those stated in the text (EBASCO 1988a, page 7-12, chloroform is 10-fold lower)
- The back-calculation of the allowable soil concentration to yield a 1×10^{-6} risk for workers on site is flawed. The calculation estimates a daily dose which, if taken every day over a 70 year period, could lead to an excess a lifetime cancer risk of 1×10^{-6}, but for this approach to be acceptable the risk calculation should factor in a lifetime exposure to the worker.
- Calculation of the amount of time spent on-site by trespassers:
  2d x 4w x 5m x 70y = 2800 days
  7d x 4w x 5m x 70y = 23520 days
  they also assume an 8 hr day so for workers this is
  5 x 48 x 50 = 12,000
  These values compute to different values than those given in the text.
- Result of the ingestion scenario:

$$SI = \frac{5580}{70} \times \frac{0.42 \times 0.22}{1000} \times \frac{7}{100} = 5.155 \times 10^{-4}$$

Cd ADI = 2.9×10^{-4} HI = 1.8

Using the highest concentration of cadmium in dust of 15,300 given in the text:

$$5.155 \times 10^{-4} \times \frac{15300}{5580} = 1.41 \times 10^{-3}$$

HI = 4.875

The number stated in the text is 48, 10 times this value.

- Inhalation Dose or Carcinogenic Risk: Table 7-12 shows the calculation of the risk from the inhalation of soil and dust on site, with the generic calculation shown in Table 7-7. The risk assessment uses standard EPA assumption for the calculation of inhaled dose; 70 year life time, 20 meter cubed/day inhalation rate. This assumes the worker or visitor/trespasser remains on site for the duration of their life. The HI given earlier in the text recognizes this problem and includes a factor to account for this:

  Worker = 0.22 Trespasser = 0.048

  These numbers should also be used in this calculation.
- Table 7-12 adds the risk from dust and soil. This implies the worker spends an 8 hour day both inside the warehouse and outside the warehouse. This is obviously a poor assumption.

7. (page 3-5)

The concentration of cadmium in soil relates to the ACGIH limit on airborne cadmium dust as follows:

$$(0.05 \text{ mg Cd dust/m}^3 \text{ air})/(0.017 \text{ mg particulates/m}^3 \text{ air}) = 2.94 \text{ mg Cd/mg soil}$$

(assuming that all particulates are of soil origin). 2.94 mgCd/mg soil is physically meaningless because cadmium would then exceed 100% of the soil mass; the result implies that up to 100% cadmium in soil would not present a significant inhalation hazard to exposed workers.

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LETTER FROM VINSON AND ELKINS JULY 6, 1988

COMMENT NO.	RESPONSE
Section 2.1	As stated in the RI report on page 4-28, the cross-sectional area calculated using Darcy's equation only represents the cross-sectional area under the influence of the aquifer pumping test. The calculated area of 26,722 ft^2 is in reality much less than the actual aquifer discharge area into East Foundry Cove. Therefore, a discharge rate of $4.0x10^5$ gpd (300 gpm) is much less than the actual natural aquifer discharge into East Foundry Cove. Also, the groundwater discharge volume presented on page 4-21 represents total groundwater discharge. The discharge volume presented by the PRP consultant uses a cross-sectional area of the plume only. Since no off-site monitoring wells were present hydraulically downgradient towards the cove, it would be erroneous to assume that the plume is only present on the site. It is shown in the report that the aquifer is highly transmissive (127,589 gpd/ft) and has an extraordinarily high flow velocity (6.7 ft/day). An aquifer with hydraulic conditions such as these will discharge more than 6750 ft^3/day (50,490 gpd) presented by the PRP consultant. By using only the area of the plume, one is assuming that the plume is migrating as a single slug. This is also an erroneous assumption since factors such as hydraulic dispersion play a major role in plume migration. Therefore, it is more realistic to use total

	groundwater discharge rather than plume discharge.
Section 2.2	Natural attenuation of the groundwater is considered completed when Maximum Contaminant Levels (MCLs) are attained. The agency believes that by removing the source of groundwater contamination (volatile organic-contaminated soil) the natural attenuation process will proceed at a faster rate.
Section 2.3	The Proposed Remedial Action Plan (PRAP) states that the existing monitoring wells will be used to conduct the long-term groundwater monitoring program. At the request of NYSDEC, EPA agreed to install bedrock wells to be used as part of the monitoring program.
Section 3.1.2	After months of discussions with representatives of NYSDOH, ATSDR, NYSDEC, Vinson and Elkins, and review of written documentation from ATSDR, EPA has decided that the 20 ppm clean-up level is protective of human health and the environment. (see attached ATSDR memo, Ebasco's Risk Assessment and Peter Grevatt's memo for further details.)
Section 3.1.3	According to SARA § 121(b), disposal of hazardous substances without treatment is the least favored alternative where practicable treatment technologies are available. It is the agency's opinion that the PRPs proposed remedy does not satisfy the preference for treatment called for in SARA.
Section 3.3	It is the responsibility of NYSDEC to locate a suitable

municipal solid waste landfill to accept the fixated wastes from the Marathon Battery Company site. In the event that a municipal landfill is not available, EPA may have to dispose of the waste in a RCRA subtitle C landfill.

Section 4

The agency has reviewed all the documents on the vault submitted by Vinson Elkins. Since the as-built drawings for the vault are not available, it is impossible for the agency to accurately determine the useful life of the vault. It is clear however, that the existing vault does not meet the minimum requirements of a containment system as set forth by RCRA (see attached RCRA memo). Moreover, the limestone treatment process used on the vault sediments does not permanently nor significantly reduce the mobility of the metals. (see attached letter on the limestone treatment.) Accordingly, the agency believes that removal of the vault would be more protective of human health.

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July 13, 1988

Delivery by Federal Express

Ms. Magalie Beausejour,
Project Manager
U.S. Environmental Protection Agency
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26 Federal Plaza, Room 23-102
New York, New York 10278

Re: Marathon Battery Company Site,
Cold Spring, New York

Dear Ms. Beausejour:

By letter of July 6, 1988, Marathon Battery Company and Gould Inc. (the "Companies") submitted comments on the draft Remedial Investigation and Feasibility Study (RI/FS) and the Proposed Remedial Action Plan ("PRAP") for Area II of the referenced site. In those comments, the Companies presented their reasoning in support of the recommended no-action alternative for the vault. We understand EPA Region II is considering the possibility of requiring excavation of the vault despite the recommendation in the PRAP that no action is necessary. Enclosed are supplemental comments of the Companies, provided by ERT, in support of the no-action alternative.

If you have any questions, please call.

Sincerely,

VINSON & ELKINS

Jeff Civins

Jeff Civins
Counsel for Marathon Battery Company

JC:ab
Enclosure
cc: Ms. Beverly Kolenberg, EPA Region II
Ms. Lisa Ryan, U. S. Department of Justice
Mr. Michael C. Veysey, Gould Inc.

Document No. 7060-001-001

Supplemental Comments of the Marathon Battery Company and Gould Inc. on the Vault in Area II of the Marathon Battery Superfund Site Cold Spring, New York

Prepared for:

U.S. Environmental Protection Agency

July 1988

ERT
An ENSR Company

Document No. 7060-001-001

Supplemental Comments of the Marathon Battery Company and Gould Inc. on the Vault in Area II of the Marathon Battery Superfund Site Cold Spring, New York

Prepared for:

U.S. Environmental Protection Agency

July 1988

This document supplements the Comments of the Marathon Battery Company and Gould Inc. on the Remedial Investigation/Feasibility Study and Proposed Remedial Action Plan for Area II of the Marathon Battery Superfund Site, Cold Spring, New York submitted to EPA on July 6, 1988. This supplement focuses on the vault on site which contains stabilized sediments dredged from Foundry Cove during a previous remedial action. Marathon Battery Company and Gould Inc. ("the Companies") believe that the vault and the entombed sediments do not pose a significant present or future risk to public health or the environment and that they may safely remain on site. The Companies reached this conclusion after considering the construction of the vault, the nature of the sediments contained within, and existing evidence that the vault is stable. The risks and costs of excavation and removal of the vault were also considered. Each of these factors is discussed below.

Vault Construction

As stated in the Companies' previous comments, the vault was designed to permanently contain the stabilized sediments. Key construction details are repeated here to provide a basis for further comments. Details on the vault construction were provided in prior submittals.

A pre-construction survey showed that the area was geologically stable. Therefore, geologic or seismic disturbances should not threaten the vault's stability. The vault was designed and constructed to effectively isolate the contents from ground and surface water: the base of the vault is approximately fifteen feet above the ground water, and the top, sides, and bottom of the vault are sealed with layers of clay and asphalt to prevent infiltration. The vault cap is insulated by three to four feet of soil to protect it from frost. Finally, the dredged sediments were mixed with limestone to ensure that the metals are insoluble. In the unlikely event that the sediments contacted water, only minute amounts of cadmium and nickel would leach away.

Vault Effectiveness

An evaluation of the vault indicates that it is and should remain an effective containment system. That evaluation included a quantitative evaluation of potential infiltration through the vault using EPA's HELP model, and an evaluation of the solubility of cadmium in the stabilized sediments. An examination of existing monitoring data indicates that the vault is now effective, fourteen years after construction. Future monitoring will ensure that, in the highly unlikely event that further remedial action were to be necessary, it would occur quickly and effectively.

- The cadmium in the stabilized sediments contained within the vault should not be particularly soluble or mobile, should the sediments contact water.
    - Cadmium forms a sulfide compound in anaerobic river sediments (EPA, 1979; Adriano, 1986). Cadmium sulfide is very insoluble and very stable. Much of the cadmium in the dredged sediments was probably in the form of insoluble cadmium sulfide.
    - Dredged sediments were thoroughly mixed with limestone before disposal. The addition of limestone created alkaline (basic) conditions in the sediment and resulted in the formation of insoluble cadmium carbonate and hydroxide compounds.
    - Adsorbtion further immobilizes cadmium in sediment or soil. Ionic cadmium adsorbs to negatively-charged exchange sites on clays, organic particulates, and hydrous oxides within the soil (Adriano, 1986).
- A model of potential leakage from the vault indicates that, even applying extremely conservative assumptions - in particular that one or more components of the vault have failed, only minute amounts of cadmium would be anticipated to leach from the enclosed sediments.

EPA developed the Hydrologic Evaluation of Landfill Performance (HELP) model to facilitate estimation of the amounts of surface runoff, subsurface drainage, and leachate that may be expected to result from the operation of a wide variety of possible landfill designs. The program models the effects of hydrologic processes including precipitation, surface storage, runoff, infiltration, percolation, evapotranspiration, soil moisture storage, and lateral drainage using a quasi-two-dimensional approach. Lateral inflow and surface runon are not accounted for by the model. The HELP model performs a sequential daily analysis to determine runoff, evapotranspiration, percolation, and lateral drainage for the landfill (cap, waste cell, leachate collection system, and liner) and obtain daily, monthly, and annual water budgets.

In this analysis, the HELP model was used to estimate the maximum amount of water percolation from the base of the vault. The maximum flux of cadmium from the bottom of the vault was estimated from the water flux by accounting for chemical and physical processes within the waste cell and in the underlying barrier clay layer.

All input parameters for the model were chosen conservatively and several scenarios were investigated. The basic vault design was modeled as a layered system with a vegetated topsoil overlying a compacted fill. Underlying these two layers were a layer of asphalt paving and a layer of putnam clay, followed by a drainage layer. Those layers cover the waste cell and then two more layers of clay and asphalt. The scenarios modeled were as follows:

> Scenario 1: drainage layer assumed to have failed (no drainage layer); asphalt assumed to be a barrier soil with hydraulic conductivity of 10^{-8} cm/sec, one order of magnitude more protective than the RCRA design permeability of the barrier clay layer; clay layer assumed to have hydraulic conductivity of 10^{-7} cm/sec.
>
> Scenario 2: drainage layer assumed to have failed (no drainage layer); asphalt assumed to be a semi-permeable liner with 1% leakage; clay layer assumed to have hydraulic conductivity of 10^{-7} cm/sec.

Scenario 3: drainage layer assumed to have failed (no drainage layer); asphalt assumed to be a semi-permeable liner with 10% leakage; clay layer assumed to have hydraulic conductivity of 10^{-7} cm/sec.

Scenario 4: drainage layer assumed to have failed (no drainage layer); asphalt assumed to be a semi-permeable liner with 50% leakage; clay layer assumed to have hydraulic conductivity of 10^{-7} cm/sec.

The simulations were performed for a twenty year period. A detailed explanation of the assumptions made in the analysis, the model input parameters, the vault scenarios, and the chemical and physical processes considered is presented in the Appendix.

The results of the simulations are shown in Table 1. The simulations are all conservative in that conservative input parameters were chosen. All of the estimated fluxes of cadmium through the base of the vault are quite low. When the asphalt is modeled as a barrier layer with hydraulic conductivity of 10^{-8} cm/sec, the estimated cadmium flux is 9.2×10^{-5} grams/yr. In magnitude, this value is between the results for the asphalt modeled as a semi-permeable liner with 1% and 10% leakage, respectively. Even in the most conservative case of the asphalt semi-permeable liner with 50% leakage, the estimated cadmium flux is only 2.1×10^{-3} grams/yr, a minute amount. In everyday terms, this amount is approximately one-thousandth of a common four-gram aspirin tablet. These four scenarios provide a conservative range of expected cadmium fluxes from the base of the vault.

- Current soil and ground-water monitoring data indicate that the vault is sound. In the remedial investigation, soil and ground-water samples were collected from locations V1 through V5 in the vicinity of the dredged spoils vault. Concentrations of metals in these samples did not indicate that leakage had occurred from the vault. In soil samples collected between the depths of 30 and 50 feet below ground surface, cadmium levels were nondetectable, cobalt levels were less than 9.5 mg/kg and nickel levels were less than 21.9 mg/kg. These levels are within the range of concentrations detected in what are presumably uncontaminated samples from locations

TABLE 1
ESTIMATED MAXIMUM YEARLY CADMIUM FLUXES THROUGH THE BOTTOM OF THE VAULT

	Flux of Cadmium Through Bottom of Vault (grams/yr)
Scenario 1	9.2×10^{-5}
Scenario 2	2.0×10^{-5}
Scenario 3	2.1×10^{-5}
Scenario 4	2.1×10^{-5}

3S and 2S.(2.5 to 7.6 mg/kg cadmium, 7.5 to 12.3 mg/kg cobalt and 18.4 to 39 mg/kg nickel). Cadmium and nickel concentrations reported in shallow soil samples collected from the vault area at 0 to 2 feet in depth are only slightly elevated above background levels. Metals concentrations are unlikely to be due to stabilized dredge spoils which were buried in the vault at depths between 3 and 15 ft. The soil data support the conclusion made in the remedial investigation report that no leakage has occurred from the vault.

Ground-water monitoring data further support that conclusion. Five ground-water monitoring wells were installed at distances between 15 and 70 feet upgradient and downgradient of the vault. The wells closest to the vault in the downgradient direction (V3 and V5) are located such that ground-water contaminants would be detected if the integrity of the vault had deteriorated. Due to the highly transmissive nature of the overburden aquifer ground-water contaminants would also quickly reach the wells farther down gradient, if a release from the vault occurred. Because the dredge spoils have been isolated at least 15 feet above the water table, contaminants would have to be leached downward in order to impact the ground water. Therefore, it is expected that the wells located adjacent to the vault would provide a good detection monitoring system. Cadmium, cobalt and nickel were not detected in any of the five wells sampled during the remedial investigation, again demonstrating that no leakage from the vault has occurred. This conclusion was reached in the Remedial Investigation (EBASCO 1988, page 5-30).

- The proposed program to monitor the five wells around the vault and to periodically inspect the condition of the cap and fencing will ensure that any damages are quickly repaired and leakage quickly detected. The contract-required quantitation limits established by the EPA for cadmium, cobalt and nickel are 5, 50 and 40 ug/l, respectively (U.S. EPA Inorganic SOW 7/85). The drinking water standard for cadmium is 10 ug/l; therefore, if a 5 ug/l detection limit for cadmium is achieved, the monitoring program will successfully indicate whether concentrations in the ground water approach or have exceeded drinking water standards. No drinking water standards have been established for cobalt or nickel. The concentration calculated from the verified reference dose for nickel is 700 ug/l. The detection limit of 40 ug/l would ensure that leakage would be detected long before the release posed a significant threat.

Risks and Costs of Excavation and Removal

The Companies' final consideration was the potential risks and costs associated with excavating the vault and its contents, and disposing of the material off-site.

There are both potential human health and environmental risks associated with the excavation, transportation, and redisposal of the vault and its contents. The following discussion identifies and qualitatively describes these potential risks.

- Health risks associated with excavation

  In general, the potential human health risks associated with excavation can be divided into two categories: (1) risks to workers and other people in the vicinity of the site from exposure to hazardous chemicals; and (2) risks, primarily to workers, from physical hazards as a result of using heavy equipment to excavate the contents of the vault.

  - Human Health Risks Posed by Chemical Exposure

    Human health risks associated with exposure to hazardous chemicals during and after excavation can occur in several ways. Removal of the existing cap that covers the vault would expose the stabilized sediments. This material could be suspended in air by wind or operation of heavy equipment. Rainfall during remediation could erode sediment particles away and transport them offsite and into Foundry Cove. Stockpiling of excavated sediment could also result in airborne releases, especially if remediation occurs during dry periods. If remediation occurred during a wet period, rainwater runoff would transport the material around and off the site.

    The potential releases discussed above could result in worker exposure to contaminants via inadvertent ingestion and inhalation. The magnitude of exposures and risks is difficult to determine but could be high if appropriate precautions were not taken. Even with such precautions, foreseen (floods) and unforeseen (accidents) occurrences could lead to significant worker exposures. Because some contaminant releases are anticipated to occur during excavation, people in the vicinity of the site are likely to be exposed to contaminants. If such exposures and risks were to occur because of an accident or flood, they would be significant in and of themselves, but they are particularly significant when compared to the risks posed by the site under current conditions. Anyone gaining access to the site during remediation could have significant exposures and risks, far exceeding any posed by the site in its current state.

- Human Health Risks Posed by Physical Hazards

Worker health risks due to physical hazards as a result of excavation, transportation, and redisposal of the vault are another important concern. In the ensuing discussion, risks of death due to occupational accidents are compared to risks of contracting cancer following exposure to potentially carcinogenic materials from the site. The physical hazards associated with operating and directing heavy field equipment such as backhoes and bulldozers are well known, and thus perhaps easily overlooked, but they are significant nonetheless and are much greater than the cancer risks estimated from exposure to potentially carcinogenic compounds at the site.

The National Safety Council (based on 1986 values) estimates that the annual occupationally-related risk of accidental death for persons working in the construction industry is 3.33×10^{-4} (National Safety Council, 1987). The risk of accidental death during excavation of the vault (estimated to require three weeks), is approximately 1.9×10^{-5}. EPA considers in general that an additional excess cancer incidence (not death) of greater than one in ten thousand (1×10^{-4}) in one's lifetime, approximately 70 years, unacceptable (EPA, 1986). The Feasibility Study of the Marathon Battery Site considered an even lower level of lifetime risk, 1×10^{-6}, to be acceptable. A lifetime cancer risk of 1×10^{-4} is equivalent to a 1.4×10^{-6} annual excess risk of cancer. Simiarly, a lifetime cancer risk of 1×10^{-6} is equivalent to a 1.42×10^{-8} annual excess risk of cancer. Thus, the risk of death due to construction accidents is higher than that considered to be significant by the EPA for human exposure to carcinogens. It should be noted that cancer risk estimates are based on assumption and extrapolation, contain a great deal of uncertainty, and represent upperbound estimates of risk based on worst case exposures. The statistics for deaths of construction workers due to accidents are based on actuarial data and therefore are much more precise than cancer risk estimates. At present the stabilized sediment within the vault poses little to no cancer risk, but its cleanup via excavation and redisposal will subject workers to a very real risk of death.

- Risks associated with transportation

  At least 300 trucks will be needed to haul the excavated material away for disposal. That represents a substantial volume of traffic through the village of Cold Spring. The additional traffic increases the risk of automobile accidents, and a truck accident could easily result in a spill of contaminated material. In addition, the traffic due to over 300 heavy trucks will increase the wear on local roadways.

- Risks associated with redisposal

  Redisposal of excavated material presents some risk of injury to landfill workers, analogous to the risks to onsite construction workers. It is important to note that redisposal does not change the potential risk of a release of contaminants, relative to continued containment in the vault on site.

Excavation of the vault and its contents and redisposal off-site will not be cost-effective. The Feasibility Study Report describes two alternatives for excavation and off-site disposal of the vault: Alternative V-3, sediment excavation/fixation/ off-site disposal, and Alternative V-6, sediment excavation/off-site treatment and disposal. These alternatives were estimated to cost a total of $4,840,000 and $3,930,000 (present worth), respectively. The necessity for treatment is doubtful, because the sediments were already treated, and as a result these costs may be overestimates. Nonetheless, these alternatives are more than ten times more expensive than continued monitoring and maintenance of the existing vault. That alternative was estimated to cost only $230,000 (present worth). The ten-fold increase in cost associated with excavating and redisposing of the vault will not result in greater protection of public health and the environment. In fact, as described above, it may increase certain risks.

Conclusions

Continued containment of the stabilized sediments within the on-site vault represents a permanent remedy which now protects and will continue to protect human health and the environment. As such, it fulfills the cleanup standards of Section 121 of SARA. Excavation and redisposal of the vault does not.

- "Remedial actions shall attain a degree of cleanup of hazardous substances, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of human health and the environment. Such remedial actions shall be relevant and appropriate under the circumstances presented by the release or threatened release of such substance, pollutant, or contaminant." (SARA § 121 (d)(1)).

  Chemical treatment of the dredged sediments and containment within the vault has ensured and will continue to ensure that human health and the environment are protected from a release of hazardous substances. Excavation and offsite redisposal would provide no additional assurance. Continued containment of the stabilized sediments within the vault is a relevant and appropriate remedial action under the circumstances.

- "Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants or contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available" SARA § 121 (b)(1)

"EPA expects that treatment of the principal threat at a site, with priority placed on treating highly toxic, highly mobile wastes, will frequently be combined with engineered and/or nonengineered controls to contain and/or prevent exposure to treatment residuals and untreated waste." (Preamble to the February 1988 draft National Contingency Plan)

The sediments contained within the vault were treated to render metals immobile. Chemical fixation of the metals in the dredged sediments and entombment within the stable vault permanently and significantly reduced the mobility and the toxicity of the waste material. All routes of potential exposure to the waste material are effectively blocked.

Excavation and offsite disposal offers no additional reduction in volume, toxicity, or mobility of the metals in the sediment. In fact, excavation of the entombed material would likely increase the volume of material which must be disposed of: the rubble of the clay layers may be partially disposed with the sediments.

SARA clearly discourages offsite transportation and disposal of waste material where equally viable and protective alternatives exist.

- "In assessing alternative remedial actions, the President shall take into account... the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment." (SARA § 121 (b)(1))

  Excavation of the vault presents a risk to workers on site and potentially to nearby residents. Transportation of the excavated material to a landfill presents further risks. Redisposal will not reduce or change the potential for hazardous constituents to leach from the sediments, and thus present a health risk; instead excavation and redisposal will merely relocate the material. Thus, excavation of the vault and redisposal will increase the potential risk to the public from excavation and transportation without changing the potential risk from disposed sediments.

- The selected remedy must be cost effective. (SARA § 121 (a))

  "The mandate to select remedies that are cost-effective requires EPA to ensure that the costs of remedial actions are in proportion to their overall effectiveness relative to other remedies

> under consideration. This requirement establishes the efficient use of resources as a standard for Superfund response actions, and reflects a desire to address as many hazardous waste sites as possible to maximize overall protection of human health and the environment." (Preamble to the February 1988 draft National Contingency Plan)
>
> Maintenance of the on-site vault will cost-effectively ensure protection of human health and the environment from the contained sediments. Excavation and offsite disposal of the vault would incur a cost of approximately $3,930,000 to $4,840,000, without providing additional protection of human health and the environment. In fact, as discussed previously excavation and redisposal would increase the risk in the short term. The cost of excavation and redisposal of the vault is not in proportion to its overall effectiveness relative to maintenance of the on-site vault.

In summary, the Companies believe that continued monitoring and maintenance of the vault will cost-effectively protect human health and the environment. Excavation of the vault and redisposal off-site is not technically justifiable.

APPENDIX

APPENDIX

The Hydrologic Evaluation of Landfill Performance (HELP) model was developed to facilitate estimation of the amounts of surface runoff, subsurface drainage, and leachate that may be expected to result from the operation of a wide variety of possible landfill designs. The program models the effects of hydrologic processes including precipitation, surface storage, runoff, infiltration, percolation, evapotranspiration, soil moisture storage, and lateral drainage using a quasi-two-dimensional approach. Lateral inflow and surface runon are not accounted for by the model. The HELP model performs a sequential daily analysis to determine runoff, evapotranspiration, percolation, and lateral drainage for the landfill (cap, waste cell, leachate collection system, and liner) and obtain daily, monthly, and annual water budgets. Both a user's guide (EPA, 1984a) and model documentation (EPA, 1984b) are available.

The model maintains five years of default climatological data for 102 cities throughout the United States. The model also stores default parameters for soil characteristics and parameters related to seven types of vegetative cover. In this analysis default options were used in a manner appropriate to the vault design.

The basic vault design was modeled as follows:

- good grass cover
- 6 in. topsoil
- 36 in. compacted dirt fill
- 2.5 in. asphalt paving
- 6 in. putnam clay
- 12 in. fill with gravel (drainage layer)
- waste cell
- 12 in. putnam clay
- 2 in. asphalt paving

The following assumptions were made in the analysis:

- default climatological data for New York City was used because it was the closest default city to Cold Spring, NY (approx. 50 miles).

- default climatological data for the years 1974 to 1978 was assumed to repeat every five years from 1978 to 1993.

- default parameters related to vegetative cover were used; vegetative cover was assumed to be good grass; conservative default values of evaporative depth (10 in), winter cover (1.2), and leaf area index were used.

- default soil characteristic parameters were used as follows:

  * the topsoil was assumed to have the soil characteristics of the most highly conductive sandy loam (USCS SM) given in the default soils.

  * the compacted dirt fill was assumed to have the soil characteristics of the most highly conductive sandy loam (USCS SM) given in the default soils and adjusted in the program for compaction.

  * the putnam clay was assumed to have the soil characteristics of the most highly conductive barrier soil given in the default soils. The hydraulic conductivity given is 10^{-7} cm/sec, which is the current RCRA permeability standard.

  * the asphalt paving was modeled in two ways: (1) it was assumed to have the soil characteristics of the less conductive of the two barrier soils given in the default soils; the hydraulic conductivity given is 10^{-8} cm/sec, which is an order of magnitude lower than that of the barrier clay; (2) it was assumed to be a semi-permeable liner with leakage of 1%, 10%, and 50%.

  * the default Soil Conservation Service runoff curve number for the soil texture was used.

- the drainage layer was conservatively assumed to have totally failed (to not exist).

The vault layer design and the layer thicknesses were obtained from design drawings.

The vault scenarios investigated were as follows. All scenarios included a clay layer with 10^{-7} hydraulic conductivity.

Scenario 1: drainage layer assumed to have failed (no drainage layer); asphalt assumed to be a barrier soil with hydraulic conductivity of 10**-8 cm/sec, one order of magnitude lower than the RCRA design permeability of the barrier clay layer.

Scenario 2: drainage layer assumed to have failed (no drainage layer); asphalt assumed to be a semi-permeable liner with 1% leakage.

Scenario 3: drainage layer assumed to have failed (no drainage layer); asphalt assumed to be a semi-permeable liner with 10% leakage.

Scenario 4: drainage layer assumed to have failed (no drainage layer); asphalt assumed to be a semi-permeable liner with 50% leakage.

The results of the simulations were estimates of the average annual leachates fluxes (ft^3/year) through the bottom of the vault.

The calculated flux of cadmium through the bottom of the vault is based on the modelled flux of the leachate, the estimated dissolved concentration of cadmium, and the retardation of cadmium through the bottom due to adsorption onto the clay liner. The model conservatively neglected adsorbtion onto the sediments themselves.

The calculation of the concentration of cadmium in solution is based on the worst-case scenario that the cadmium has reached its solubility limit. Due to the limestone (calcium carbonate) that was added to the system for stabilization, the predominant forms of cadmium are expected to be cadmium hydroxide, $Cd(OH)_2$, and cadmium carbonate, $Cd(CO_3)$. Stumm and Morgan (1981) show that for a closed system containing calcium carbonate, the pH is 9.9 and pCO_3^{-2} is 4.4. The maximum solubility of cadmium has been calculated for both cadmium hydroxide and cadmium carbonate to determine the limiting reaction.

For this system, cadmium carbonate controls the equilibrium concentration of cadmium in solution. The equilibrium constant for cadmium carbonate is 11.4 (Santillan-Medrano and Jurinak, 1975), thus

$$[Cd^{2+}]\ [CO_3^{-2}] = 10^{-11.4} \text{ moles/liter}$$

$$[Cd^{2+}] = 10^{-7} \text{ moles/liter}$$

$$[Cd^{2+}] = 1.1x10^{-5} \text{ grams/liter.}$$

Therefore, the maximum concentration of cadmium in solution is approximately $1.1x10^{-5}$ grams/liter.

The cadmium transport through the clay liner will be retarded due to adsorption of cadmium onto the clay. The retardation factor, R, is calculated as

$$R = 1 + p_b \times k_d/\theta$$

where p_b is the bulk density of the sediment, k_d is the partition coefficient and θ is the sediment porosity. The bulk density is assumed to be 1.5 gm/cm^3, and the porosity is assumed to be 40%. Battelle (1984) found distribution coefficients for montmorillonite clay to average around 140 ml/gm. The retardation factor is thus found to be 526.

The flux of cadmium can then be calculated from the following equation:

Flux of Cadmium = (Flux of Water) x $[Cd^{2+}]$/(Retardation Factor)

The calculated values for the flux of cadmium form the HELP model simulation scenarios are found in Table 1 of the text.

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LETTERS FROM VINSON AND ELKINS-PRP
Pepresentative - July 13, 1988

We have fully reviewed the information in the July 6 and July 13, 1988 submittals. As discussed earlier, it is impossible for the agency to accurately determine the useful life of the vault. It is clear however that the existing vault does not meet the minimum requirements of a containment system as set forth by RCRA (see attached RCRA memo). Moreover, the limestone treatment process used on the vault sediments does not permanently nor significantly reduce the mobility of the metals. (see attached letter on the comparison of the chemical fixation process with the limestone treatment). Accordingly, the agency believes that removal of the vault would be more protective of human health and the environment. Alternatives for waste transport will be considered during the design phase of this project.

. ARMY ENGINEER DIVISION HUNTSVILLE

CORPS OF ENGINEERS

SIGN REVIEW COMMENTS

PROJECT DERP C02NY060200, Marathon Battery Site

SITE DEV & GEO TECH ☐ MECHANICAL ☐ SAFETY ☐ SYSTEMS ENG
ENVIR PROT & UTIL ☐ MFG TECHNOLOGY ☐ ADV TECH ☐ VALUE ENG
ARCHITECTURAL ☐ ELECTRICAL ☐ ESTIMATING ☐ OTHER
STRUCTURAL ☐ INSTR & CONTROLS ☐ SPECIFICATIONS

REVIEW Inventory - PRP Status TYPE
DATE 12 Jul 88
NAME Scott Bradley

ITE	DRAWING NO. OR REFERENCE	COMMENT	ACTION
	General	The ERT report provides several valid points reducing the size of the remedial action. All proposed actions would also reduce DOD costs for RA. Many comments debate the validity of preliminary assumptions based on a "worst case" scenario. The applicability of this scenario cannot be justifiably refuted. Other comments hinge on inconsistencies within the report or the ROD and other technical inaccuracies. Those comments are addressed below.	
2	Comment 2.1	Concur that discharge calculations in the ERT report should not use pump test withdrawal rate; however, using pump test recharge rate is more applicable than using plume area at discharge to represent aquifer area.	
3	Comment 2.2	Concur. RI report supports the conclusion that leaching of hazardous amounts of cadmium is not probable, therefore, removal of contaminated soil is not consistent with "no action" decision for groundwater.	
4	Comment 3.3	Concur. Rehabilitation of the sprinkler system is not supported by risk data.	
5	3.3	Concur. The treated soil/dust is no more hazardous than treated sediments and should be similarly disposed.	
6	Comment 4.0	Concur. Analysis of surface vegetation and subvault soils would not be as accurate or useful as groundwater data.	

ACTION CODES:
A — ACCEPTED/CONCUR
D — ACTION DEFERRED
W — WITHDRAWN
N — NON-CONCUR
VE — VE POTE L/VEP ATTACHED

ND FORM 7

PREVIOUS EDITIONS OF THIS FORM ARE OBSOLETE

LETTER FROM Scott Bradley, U.S. Army - July 12, 1988

COMMENT NO.	RESPONSE
1.	Details for this comment are found in the responses to PRP comments.
2.	The U.S. Army concurs with the comments submitted by ERT. As discussed earlier and as stated in the RI report on page 4-28, the cross-sectional area calculated using Darcy's equation only represents the cross-sectional area under the influence of the aquifer pumping test. The calculated area of 26,722 ft^2 is in reality much less than the actual natural aquifer discharge area into East Foundry Cove. Therefore a discharge rate of 4.0x10^5 gpd (300 gpm) is much less than the actual natural aquifer discharge into East Foundry Cove. Also the groundwater discharge volume presented on page 4-21 represents total groundwater discharge. The discharge volume presented by the PRP consultant uses a cross-sectional area of the plume only. Since no off-site monitoring wells were present hydraulically downgradient towards the cove it would be erroneous to assume that the plume is only present on the site. It is shown in the report that the aquifer is highly

transmissive (127,589 gpd/ft) and has an extraordinary high flow velocity (6.7 ft/day). An aquifer with hydraulic conditions such as these will discharge more than the 6750 ft^3/day (50,490 gpd) presented by the PRP consultant. By using only the area of the plume, one is assuming that the plume is migrating as a single slug. This is also an erroneous assumption since factors such as hydraulic dispersion play a major role in plume migration. Therefore, it is more realistic to use total groundwater discharge rather than plume discharge.

EPA will develop a health and safety plan to minimize the risks posed by increased traffic from the site. In addition, the remedy does not contemplate shipment of hazardous materials off-site.

3. That's correct, Leaching of cadmium from the soil to the groundwater is not significant. However, leaching of volatile organics is probable.

4. EPA agrees with this comment.

5. EPA agrees with this comment.

6. EPA agrees with this comment.

Meeting Marathon Battery Company Superfund Site (Site)
July 14, 1988, Region II
Attendance List Attached

Marathon Battery Company and Gould, Inc. requested a meeting with EPA, DEC and representatives of the Village of Cold Spring to present their comments on the Proposed Remedial Action Plan (PRAP) and to indicate to what extent they were willing to participate in the remedial action for Area 2 of the Site.

At the commencement of the meeting Beverly Kolenberg, EPA Office of Regional Counsel, stated that the statements made during the meeting would be part of the administrative record, and a memorandum of the meeting would be included in the administrative record. Further, a decision would be made after the meeting on whether to reopen the comment period. (That is a question for the Regional Administrator.)

She stated that at present the new proposed National Contingency Plan (NCP) is in "red border review" within the Agency. The draft deals with questions relating to the selection of a remedy after the 1986 amendments to Superfund. The subject of this meeting is the appropriate remedy for Area 2 of the Marathon Battery Company Site.

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. §9601 et seq. contains a good deal of text attempting to define cleanup standards which are important in this case. The relevant sections of CERCLA include:

121(a)-appropriate remedial actions are those which are in accordance with this section and to the extent practicable the NCP and which provide for a cost effective response.

121(b)-states remedial actions in which treatment permanently and significantly reduces the volume, toxicity or mobility of hazardous substances, pollutants and contaminants is a principal element...to be preferred.

The Section says that the Agency shall conduct an asssessment of permanent solutions and alternative treatment technologies which at a minimum take into account:

A. Long term uncertainties associated with land disposal

B. The goals, objectives and requirement of RCRA (42 U.S.C. 6901 et seq.)

C. The persistence, toxicity, mobility and propensity to bioaccumulate of such hazardous substances and their constituents

D. Short and long term potential for adverse health effects from human exposure

E. Long term maintenance costs

F. The potential for future remedial action costs if the alternative remedial action in question were to fail, and

G. The potential threat to human health and the enviroment associated with excavation, transportion and redisposal or containment.

121(d)- "degree of cleanup" ... Such remedial actions shall be relevant and appropriate (ARAR) under the circumstances presented by the release or threatened release of such substance, pollutant or contaminant.

The source of ARARS under the statute includes "any standard, requirement, criteria or limitation under federal law" and "any promulgated standard, requirement, criteria or facilites siting law that is more stringent than any federal standard."

In sum, CERCLA, as amended requires that the remedy be cost effective but adds that it must meet the requirements under other federal and state environmental laws and that a priority be given to the selection of a permanent remedy.

The final selection criteria are enumerated in Section 300.430(d)(3)(ii) of the NCP:

-overall protection of human health and the environment
-compliance with ARARS
-long term effectiveness and permanence
-reduction of toxicity, mobility or volume
-short term effectiveness
-implementability
-cost
-state acceptance
-community acceptance

The remedial action decision is based on a balancing of the selection of remedy criteria.

Jeff Civins, Esq. on behalf of Marathon Battery Company and Gould, Inc. (Companies) introduced their representatives and noted that Professor Harry Gregor was invited here as a resource to provide information about the Vault. The Companies' technical consultants from ERT included Bob Clements, Kate Sellers and Bob Zoch.

Mr. Civins stated the following:

Area 2 was different from Areas 1 and 3. The Companies believe that the Consent Agreement in 1973 (70 Civ. 4110) released them from future liability for cleanup of Areas 1 and 3, and they are not inclined to perform that cleanup. Their participation therefore, is in commenting, not taking the lead. In addition, they have serious concerns about the feasibility of the remedial options.

Area 1 is owned by the State of New York.

Area 2 presents a different situation with the exception of the Vault. The Companies were required to construct the Vault by the government and the District Court. The Companies' concern relates to the way process works with respect to the RI, FS and the PRAP.

The Companies have submitted comments but since the submittal of comments, EPA may ignore the no action alternative and require excavation of the Vault. Such a situation suggests that the process is not working as it should. The public submitted a petition and DEC commented on the PRAP. While public input is relevant, ultimately a remedy is driven by environmental and not political solutions.

Professor Gregor designed and oversaw implementation of the Vault; initial comments will address the Vault. Originally the plans and specifications for the Vault were approved by the Court, the EPA, DEC and New York State.

Mr. Civins said his agenda for the meeting was to discuss comments from the Companies with respect to the RI/FS, and the PRAP, except for Vault issues (to be dealt with last when the representative of the Village would be in attendance), the potentially responsible parties, and options that might allow achievement of goals with respect to the Site. He said that he was sorry that New York State was not at the meeting.

The Companies have supplemental comments to amplify their original comments with respect to the vault. ERT comments were reviewed by Marathon and Gould. They are evironmentally sound and cost effective. The PRAP is a sound document but there are areas of disagreement.

Ground Water: The Companies agree with the conclusion of EBASCO and

EPA for no action. ERT's reasoning is different. EBASCO stated a large flow through the Site will flush contamination. ERT believes that the flow is not as great as EBASCO said, but the amount of contamination in the ground water is signiticontly less than suggested by EBASCO. Also ERT thinks that if the Village of Cold Spring wants to use the ground water it is possible with certain considerations - no threat, no remedial action required. Also relevant with respect to soil cleanup.

For interior remediation of the plant itself, dust should be addressed. The Companies are not in agreement with respect to cleanup levels. No necessity to focus on suitablity of cleanup level in the building because in agreement that the dust should be removed. In contrast, the calculation of clean up levels in the soils is different.

Another remediation option for soils which achieves the objectives under SARA specifically is to excavate till levels are achieved. Capping is an EPA rejected option. Bob Zoch suggested excavating 6" and paving. 75% of contaminated soil will be removed. The advantage of this hybrid option is that this can significantly reduce contamination on Site, immobilize cadmium, and reduce trucking and treatment. There also are no significantly lower transportation and construction risks. It is an environmentally sound option in cost effective way.

The sprinkler system is not relevant, no justification for repair.

Rob Clements-

SARA criteria considered by ERT.

Kate Sellers-

Same conclusion as EPA on ground water, different calculation with respect to flow, artificial flow rate used by EBASCO overestimated.

Retardation of VOCs, lower flow of water and chemicals through the aquifer, same effect as EBASCO predicted.

VOCs and soil data based on few sampling points, low concentration, few data. Remediation of VOC in soils not justified

Volume calculations, not agreed with.

Water Supply Wells- Given concentrations and flux wells; well near site, no VOCs. Only way there may be a problem is if a well is put in the middle of the plume.

Monitoring Program - Bedrock monitoring as suggested in RI/FS but not PRAP would be a good idea.

Remedial Proposal for Soils:

Disagree with that for Vocs in soils; goal to prevent runoff. Justification of cadmium level not provided. 50 ppm from risk assessment - ERT has questions on the assumptions for this and the 10^{-6} level. Some exposure assumptions could be less conservative. Time that workers spend on the Site is lower than in the risk assessment. Mystified by the leaching of cadmium from the soils to ground water. In sum, disagree with 50 ppm.

EPA's response was that the cleanup level for soils from ATSDR is 20 ppm based on a Department of Agriculture study of ingestion of vegetables. Protective and cost effective. No risk based assumption for background. Companies requested supporting data from ATSDR.

The Companies' view is that SARA does not say select an arbitrary figure. With their proposal, take out the bulk, permanently and significantly reduce volume and toxicity. Excavated soil treated on or off site. Paving will prevent dermal contact, ingestion, dust in the air and run-off. This approach is a permanent solution that will reduce toxicity, mobility and risk. If this remedy is economically sound and cost effective, cleanup level is moot.

EBASCO's response was that 6" and paving of approximately six acres, approximately 5,000 cubic yards of material removed, and capping is expensive. An area of the site is heavily vegetated and not subject to removal. In further discussion, ERT clarified that the hybrid proposed was interded to be implemented only in contaminated areas. EBASCO will consider the option on removal and paving, get agreement on the facts. The risk numbers are relevant off-site. Further, they will have a dialogue on risk assessment. If the option is a good one, the costs may be less. With respect to ground water issues, they will identify issues of agreement and disagreement. EBASCO will recalculate and reevaluate based on the information provided at the meeting.

Dino Mularadelis, Village Attorney -

The community is alarmed about their lack of information. The Village has not done any tests or exploring of property. Sufficient testing of wells was not done.

There is a water shortage in the Village and they intended to hook up to the Marathon well and then to also supply water to Nelsonville. The County Health Department told the Village not to use the wells.

In addition, there is concern about the health of the public and of former employees of the Companies.

Jeff Civins said that The appropriate PRPs are the State of New York and the Village of Cold Spring. From the Companies' view the only question is whether they have an affirmative defense to liability. The State of New York signed the consent decree and has had responsibility for the Site. The state owns the bed of the cove, the marshes, and the river and no third party defense is available.

Key Points on the Vault

Marathon and Gould constructed the Vault with the restrictions imposed by the Court. It was a joint effort and the Village, the State and the Companies were involved. The deed was recorded in the Village, and it contained restrictions on the site of the Vault. The plan for the construction was approved and the State and the Village signed off. Now there is political pressure to move the Vault, no scientific basis.

The Vault is effective, and cadmium is immobile. Analysis of scenarios considered cadmium load to saturated and unsaturated zones risks and costs of removal and requirements of SARA. Concluded that no technical reason to remove Vault. Remedial investigation information looked at by ERT indicated that Vault is not leaking thus far.

Qualitative look at Vault: Sediments came from the river and are somewhat insoluble. The sediments were mixed with limestone. Metals are not very mobile. The Vault was constructed in an area of geological stability, with one foot of clay, layer of asphalt, solidified sediments and three or four feet of soil.

Quantitatively used EPA HELP model (copy attached), other New York parameters. Even using worst case assumptions, next to no cadmium would leach.

Risk - consulted actuarial data with respect to construction because of the large amount of construction required and the number trucks leaving the area - increased risk. Greater risk to move the Vault than to leave it in place.

No evidence that any migration of cadmium through the soil or from the soil to ground water. Was permanently demobilized in accord with SARA. Does not pose a threat. No basis in the record with respect to the lack of permanence of the remedy. David Hird, U.S.D.O.J., added that permanence is a statutory term.

EBASCO requested the "as built" drawings of the Vault and any construction drawings and specificatons. Dr. Gregor indicated that Niny Construction built the Vault. Mr. Niny is at (914) 831-2221. Gregor also stated that a geological survey had been done and that may have been part of the records that Gorman Reilly of the U.S. Attorney's Office had.

Where do we go from here? Recommendation that Mr. Civins would make to the Companies:

Area 2, do something do not have the defenses that the Companies have for Areas 1 and 3 (sued in 1971 and cannot be sued again). The U.S. Army and New York State should be involved. Village of Cold Spring is not yet a prp.
On Site:

What proposed makes sense for inside the building. In agreement with no action for the ground water. Invite the Army to participate, or go against the Army for part of the cost. If option with removal of the Vault is selected, costs will escalate. Companies are not suggesting that government ignore the Vault; monitor it. If there is a future problem with the vault, deal with it.

Triggering mechanism can be part of settlement with specified contingencies. Vault was to be kept in repair under the original consent decree. If monitoring detected a problem, deal with it, not excavate.

Off-Site Contamination: ATSDR memo indicated that concentrations of 20 ppm of cadmium in soils were the safe level. Companies want to understand the level set by ATSDR. There are cleanup concerns of the people in Cold Spring. More systematic sampling, then take the data and decide what to do with it.

Area 3

Clear relationship between Areas 1 and 3. Companies propose to make available experts to meet with the Agency and EBASCO to discuss:

1. Toxcicity of cadmium in the aquatic environment

2. Effects of dredging

3. Restoration of the wetlands

Personal concern of Mr. Civins is that though immediate outfall area is filled with junk, that Cove and Marsh appear healthy. Concerned that the options irrevocably affect the environment adversely.

In return for cleanup would want a release from liability with a reopener for the Vault. Removal of the Vault would be a sticking point, but Companies agree with EBASCO overall.

The participants agreed to look into the matters raised and to talk again. The meeting was adjourned.

Marathon Battery Superfund Site
Meeting July 14, 1988
Room 2200 26 Federal Plaza, New York

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Nickie DiForte	SCB-NYCCS-EPA	(212)264-0570
DOUGLAS TOMCHUK	SCB-NYCCS-EPA	(212) 264-7508
David HIRD	EES, DOJ	(202) 633-2807
Lisa Ryan	EDS, DOJ	(202) 633-3126
Frank Tangorra	USCoE - NAD	(212) 264-4025
FRANKLIN R. WEISS Atty	11 MIDDLE NECK Rd GREAT NECK, N.Y	516-482-1900
DANIEL WEINER	M.D.I.	
Harry Yeh	EBASCO	(201) 460-6502
MARK MOESE	EBASCO	(201) 460-5920
NEIL J WILDING	EBASCO	(201) 460-6077
HARRY GREGOR	Columbia Univ	212 / 280-4716
MICHAEL VEYSEY	GOULD INC	312 640-4716
Jeff CIVINS	VINSON+ELKINS (Marathon)	512/ 495-8540
BOB ZOCH	ENSR / ERT	713 / 520-9494
Joe Freeland	Vinson & Elkins (Marathon)	512/495-8540
JIM GIBBS	GOULD	312 - 882 - 5576
Kathleen Sellers	ERT	617/369-8910
Rob Clemens	ERT	617/369-8910
ERIC WAXMAN	Cadwalader Wickersham & Taft for Chap 7 Trustee, Merchandise Dynamics	212/504-6427
[illegible]	[illegible]	[illegible]

HARVARD MEDICAL SCHOOL ◆ BRIGHAM & WOMEN'S HOSPITAL
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August 19, 1988

Mr. Jeff Civins, Esq.
Vinson & Elkins
816 Congress Avenue
First City Centre
Austin, Texas 78701-2496

Dear Mr. Civins:

I have now reviewed the documents you sent me dealing with the Marathon Battery Company site at Cold Spring Cove, Putnam County, New York. These documents include the record of decision for Area 2, excerpts from the remedial investigation/feasibility study (RI/FS) for Area 2, EPA'S proposed remedial action plan (PRAP), June 20, 1988, comments of the New York State Department of Environmental Conservation and of the Agency of Toxic Disease Registry (ATSDR) on Area 2 and the draft ATSDR report on cadmium. The regulatory decisions regarding the disposition of the site apparently are based, to a large extent, on the supposed threats of cadmium to human health cited in the extensive documentation provided. It is my understanding that you would like me to comment on these matters based both on my knowledge of and research on the biological, medical, pharmacological and toxicological characteristics of cadmium.

A restatement of the published facts bearing on these matters would not serve much purpose. I do want to point out some issues and problems which have not been addressed in most of the textbooks or publications cited but which to me seem to be of utmost importance to the issues at hand.

Among the most important of these considerations are the criteria employed to determine the normal metabolism of cadmium. The facts show that it is not only tolerated well (Sherlock et al., The Science of The Total Environment 29, 121, 1983; Barltrop and Strehlow, The Lancet p. 1394, 1982) but potentially plays physiological roles (Vallee and Ulmer, Ann. Rev. Biochem. 41, 91, 1972). Definitions for its conceivable pathological, toxic effects are also required so that there are criteria for its intolerance. Chemical analyses for cadmium and histological as well as chemical examinations of body tissues and fluids are the primary data for such evaluations.

At this juncture it must be emphasized that judgment of normal and/or abnormal metabolism of any metal generally assumes that the metal under examination has been ingested and is then absorbed from the gastrointestinal canal to be excreted there or in the urine. As a rule, the metal to be examined will be provided in the diet through the food chain. If there is a different channel for administration and absorption of the metal, this of itself is part of the pathology.

The channel through which cadmium is taken in and absorbed is the critical factor which determines the existence and nature of its toxicity and intolerance. When cadmium is ingested as part of the food chain, even seemingly very high concentrations are totally harmless and innocuous (Sherlock et al., 1983; Barltrop and Stehlar, 1982, see above). In fact, cadmium will likely prove to be biologically essential, as is apparent from its occurrence in a natural product, metallothionein.

However, when it is inhaled in relatively large quantities it causes serious toxicity and disease. In this regard it closely resembles zinc, copper and magnesium. All of these, like cadmium, cause "metal fume fever", diseases which are prevented by suitable industrial hygienic measures.

The inhalation of cadmium results in severe toxicity, and the work of virtually all of the toxicologists that have studied the role of cadmium in man has focused upon this particular route of administration. By far the predominant part of this work has been contributed by Friberg and his colleagues Kjelstrom, Piscator and Nordberg at the Karolinska Institute, Stockholm, Sweden who have detailed this condition which affects individuals working in cadmium smelters, the cadmium electroplating and electric welding industry or wherever cadmium containing electrodes are handled. These occupational exposures have raised considerations regarding the content, body-burden, metabolism, transport, distribution, excretion and biological half-time of cadmium in tissues and biological fluids. All of these have been scrutinized to serve as indexes of exposure to and concentration of cadmium. Its effects and dose-effect relationships in chronic poisoning have been particularly important. Kidney damage, anemia, and liver pathology have been seen. All can be prevented by lowering the level of cadmium in the ambient environment and removing the hazard imposed by the industrial work place.

It is for these relatively high exposures to cadmium in air and its inhalation that the cadmium content of blood, urine, tissues and, of course, the environment have become decisive measures of cause and effect and, hence, normality or toxicity. As expected, pathological consequences now recognized widely correlate closely with cadmium concentrations in tissues. The condition has been remedied almost entirely by suitable industrial health measures.

It is of the utmost importance to be reminded here that these circumstances are virtually identical to those 60 years ago in regard to zinc smelters. Zinc in the ambient air of smelters caused a disease known widely as "metal fume fever" or "zinc shakes". Primarily due to the work of Cecil and Philip Drinker, "zinc fume fever" was eliminated completely by suitable, industrial hygienic measures in the workplace. This work also led to the recognition that ingested zinc is not only not toxic, but to the contrary, is essential biologically. This insight was then not appreciated at all.

Katherine Drinker undertook the pertinent work in 1926 which was designed to understand "metal fume fever" better. She concluded that zinc is ubiquitous, present in all tissues of both animals and man not exposed to the hazards of the zinc workplace and that it has a normal biological function which is unrelated to the effect of the metal seen in "metal fume fever" i.e., when zinc is inhaled. She detected so much zinc in unexposed, healthy individuals that this seemed inconsistent with the then prevalent view that zinc is highly toxic. In point of fact, ingestion of large amounts of zinc cause no toxicity at all, and there are no pathological consequences. History has borne out Dr. Drinker's analysis of the data and her predictions. (Drinker and Collier, J. Indust Hyg. 8, 257, 1926).

It is now known that zinc is indispensible to the function of more than 200 enzymes! Zinc is now prescribed and sold widely together with metals and vitamins as an essential dietary mineral supplement.

In the following discussion we need but to replace "zinc" by "Cadmium"! The analogy is virtually complete. When ingested by humans, like zinc, cadmium is virtually non toxic. Thus, the great concern regarding the role of cadmium in the food chain of man has very little if any factual basis. I am unaware of valid evidence relating ingestion of even relatively large amounts of cadmium to abnormally high serum or cadmium contents that signal cadmium accumulation and any pathological consequences. The dietary survey at Shipham, Somerset (U.K.) is telling evidence of this assertion. In this cadmium rich area, the crops grown and their effect on man were examined. (Sherlock et al.; Barltrop and Stehlar, 1982, see above). There was not the slightest evidence of any deleterious effects or toxicity in humans. There is simply no evidence for any adverse effects of dietary cadmium on human health.

Two situations are often quoted as exceptions to the above statements. They require elaboration. Itai-Itai disease on the one hand and hypertension on the other have been cited widely as proof or examples of cadmium toxicity due to ingestion of the metal. The assertions regarding both have been placed in serious question, but their fate are examples of the old saw that "it takes one poor paper to get unproven information into a textbook, but thirty years to get it out". It has yet to be proven that Itai-Itai is truly a "cadmium toxicity ingestion disease". Its pathogenesis, in point of fact, is quite uncertain. Itai-Itai has been diagnosed in a higly select population of Japanese women subsequent to multiple pregnancies or the menopause. Bone pain and fractures were the result of osteomalacia accompanied by nephropathy and increased urinary amino acids, glucose and calcium; cadmium was also increased in blood and tissues. All of these were attributed to the rice diet of high cadmium content consumed by these women. There never was nor is there now any evidence that cadmium found in the rice diet was more than coincidental and caused any of these symptoms. All of the cause/effect relationships remain open to questions. The most important question is, of course, why the disease was only seen in women with osteomalacia which is generally the consequence of endocrinological changes that accompany pregnancy or aging.

In a recently published, long-term 6 year study, (Nomiyama and Nomiyama, Essential and Toxic Trace Elements in Human Health and Diseae, Alan R. Liss Inc., New York 1988 pp. 589-609) monkeys were fed rice containing cadmium at the same level as that purported to have been eaten by Itai-Itai patients. None of the animals developed any pathology attributable to cadmium! For all intents and purposes, this critical experiment should terminate the debate.

Many years ago Schroeder claimed that cadmium is the cause of essential hypertension, an assertion which was never confirmed and which has long since been disproven; it was hardly ever accepted by anyone other than Schroeder. (Parenthetically, the history, problems and confusion caused by Schroeder's activities would require a separate report).

In short, individuals said to suffer from Itai-Itai disease are normotensive. The monkeys in the Nomiyama study also remained normotensive. Hypertensive individuals do not accumulate cadmium nor do they suffer from Itai-Itai disease. There is no evidence that cadmium is related to hypertension or cardiovascular disease in any manner. While this claim has long since been negated in the medical literature, it has survived - albeit without substantiation - in the toxicology literature.

The supposed link between Itai-Itai disease and cadmium is also reminiscent of a finding regarding mercury some 15 years ago: swordfish were the culprits. Swordfish were shown to contain "abnormal" amounts of mercury thought to be due to pollution. Grave questions regarding this observation led to the banning of swordfish as a food. After years of investigation and soul searching the finding proved specious. The high selenium content of ocean fish neutralizes any potentially toxic actions of mercury whose presence in ocean fish was shown to predate historic times, judging by analyses of suitable paleontological material (Wilmsen, Meyers. Ecol. Food Nutr. 1, 1, 1972). Mercury in swordfish proved not to be the consequence of present day pollution but of a biological quirk of creation!

Any discussion of the cadmium toxicity problem would be incomplete without mentioning the existence of metallothionein, a protein discovered some thirty years ago (Margoshes and Vallee 79, 4813, 1957). It contains both cadmium and zinc in substantial quantities but its function has remained undefined; it clearly does have a major biological role. It exists in virtually all phyla and species and its cadmium content makes it the first cadmium containing natural product to be known. Most recently phytochelatins of plants have also been described to accumulate both zinc and cadmium in considerable amounts. Phytochelatin containing plants readily grow in cadmium rich soils that were considered "toxic" heretofore. The presence of such plants in the food chain has not resulted in any symptoms of cadmium-induced human disease, though the examination of this putative relationship needs to be extended.

Where does this leave us in regard to cadmium at the plant site and cadmium deposits in the Cold Spring Cove of Putnam County New York?

Based on my knowledge and review of the pertinent literature, I conclude that the presence of cadmium in offsite soils does not pose a threat to human health through ingestion. Similarly, though cadmium at relatively high concentrations could pose a potential threat to human health through inhalation, the presence of cadmium onsite should not pose a threat through ingestion. Based on the data derived from the investigation of Area 2, the possibility of cadmium effects on human health from cadmium in sediments in the Cove and ore marshes at this particular site is not only improbable but impossible. The burden of proof rests on anyone claiming the contrary. Quite the same, definitive experiments are needed to avoid future mistakes in handling analogous situations. The adaptation of plants to high cadmium contents of soil suggests an ecological balance which deserves to be explored and understood.

Based on all the information available, I must conclude that the cadmium in the Cold Spring Cove of Putnam County, New York does not constitute a human health hazard. They do, however, offer an unrealized opportunity. The Constitution Marsh portion of this area is presently a wildlife sanctuary. There does not seem to be any intent or demand for its cultivation. Hence, it could serve to become an extraordinarily important step forward to understand the potential of cadmium in biology and toxicology. If this land would continue to be maintained as a sanctuary, it could allow the study of plant and animal responses to cadmium. I would further recommend that Foundry Cove Marsh be preserved as a sanctuary in order to study cadmium ecology. In that case, no changes would have to be made other than to study the existence of the balances that play a role in nature and that have not been investigated heretofore under such circumstances.

I hope that my comments will assist in resolving the present conundrum. With best regards.

Sincerely yours,

Bert L. Vallee

Bert L. Vallee
Paul C. Cabot Professor of
Biochemical Sciences

BLV/kmh
enc.

Bert Lester Vallee

Born June 1, 1919

1938	B. S. University of Bern, Switzerland
1943	M. D. New York University, College of Medicine, New York
1946-1949	Research Fellow in Medicine, Harvard Medical School
1948	Research Associate, Department of Biology, Massachusetts Institute of Technology
1948-1954	Research Associate, Department of Medicine, Harvard Medical School
1954-1955	Associate Professor, Harvard Medical School
1955-1960	Assistant Professor of Medicine, Harvard Medical School
1954	Director, Biophysics Research Laboratory, Harvard Medical School and Peter Bent Brigham Hospital
1959-1980	Director of The Clinical Chemistry Laboratory, Peter Bent Brigham Hospital
1960-1964	Associate Professor of Medicine, Harvard Medical School
1961	Physician, Peter Bent Brigham Hospital
1962	Merck, Sharpe & Dohme Professor, University of Washington
1963	Arthur Kelley Lecturer, Perdue University
1964-1965	Professor of Biological Chemistry, Harvard Medical School
1965-1980	Paul C. Cabot Professor of Biological Chemistry, Harvard Medical School
1968	Scientific Advisory Committee, New England Enzyme Center, Tufts University
1969	Warner-Chilcott Award of the American Association of Clinical Chemists
1970	Advisory Board, La Trinidad (Health Care Facility), Caracas, Venezuela
1971	Dupont Lecturer, University of South Caroline
1972	Venable Lecturer, University of North Carolina
1974	National Academy of Sciences
1975	Medical Alumni Achievement Award, New York University Medical Center
1976	Buchman Award and Lecturer, California Institute of Technology
1976	Chairman, U.S. National Committee for the International Union of Biochemistry
1976	Swiss Society for Biochemistry, Honorary Foreign Member
1977	Royal Danish Academy of Sciences and Letters
1978	Arthur K. Watkins Visiting Professor in Chemical and Life Sciences, Wichita State University
1978	Visiting Professor, University of Zurich and Federal Institute of Technology, Zurich, Switzerland

1979	Tracy and Ruth Storer Visiting Professor in Life Sciences, University of California, Davis
1979	Visiting Professor, Oberlin College, Oberlin, Ohio
1980	Paul C. Cabot Professor of Biochemical Sciences, Harvard Medical School
1980	Head, Center for Biochemical and Biophysical Sciences and Medicine, Harvard Medical School
1980	Head, Center for Biochemical and Biophysical Sciences and Medicine, Brigham and Women's Hospital
1980	Biochemist-in-Chief, Center for Biochemical and Biophysical Sciences and Medicine, Division of Clinical Chemistry, Brigham and Women's Hospital.
1980	Linderstrom-Lang Medal and Award
1981	Willard Gibbs Medal and Award of the American Chemical Society
1981-1984	Chairman, Section of Biochemistry, National Academy of Sciences
1982	William C. Rose Award in Biochemistry
1986	Overseer, Academia Sinica
1986	Visiting Professor of Medicinal Chemistry, Massachusetts Institute of Technology, Cambridge, MA
1987	Wellcome Visiting Professor of Biological Chemistry, Emory University School of Medicine, Atlanta, GA
1987	Visiting Lectureship, Biochemistry Fundamental to Medicine, The Weizmann Institute of Science, Rehovot, Israel
1987	Doctor of Medicine (Honoris Causa) Karolinska Institutet, Stockholm, Sweden
1987	Honorary Professorship, Tsinghua University, Beijing, China

Author of more than 500 publications (formal articles, chapters of books) on: zinc and other metalloenzymes, their structure, function, and mechanism of action; diagnosis of diseases, description of hitherto undescribed diseases; emission, absorption, circular dichroism and magnetic circular dichroism spectroscopy; inorganic and organic chemical modification of proteins. The biochemical and genetic bases of normal and abnormal alcohol metabolism and addiciton. The biological, biochemical, and genetic bases of organ formation, i.e. organogenesis. Editor of scientific journals.

LETTER FROM DR. BERT VALLEE - AUG. 19, 1988

Representatives of ATSDR and NYSDOH met with Dr. Vallee on September 1, 1988 (see attendance sheet). The list of references used by ATSDR was later sent to Vinson and Elkins.

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August 23, 1988

Ms. Beverly Kolenberg
U. S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

Re: Marathon Battery Company Site
Cold Spring, New York

Dear Ms. Kolenberg:

On July 14, 1988, representatives of Marathon Battery Company and Gould, Inc. (the "Companies") met with, among others, representatives of Region II of the United States Environmental Protection Agency ("EPA"), the United States Army Corp of Engineers, the current site owner, and the Village of Cold Spring to discuss the comments of the Companies concerning the remedial investigation/feasibility study (RI/FS) and proposed remedial action plan (PRAP). In that meeting, questions were raised concerning the RI/FS risk assessment performed to establish on-site soil remediation levels for cadmium and concerning recommendations of the Agency for Toxic Substances Disease Registry (ATSDR) and of the State of New York concerning the concentration of cadmium in off-site soils. In a subsequent telephone conversation, the Region indicated that a risk assessment would be performed for off-site soils and that the comment period for Area 2 would be extended to allow comments on that assessment.

At the meeting, the Companies indicated that they had retained medical experts to review pertinent information concerning cadmium. One of these experts, Dr. Bert Vallee of Harvard Medical School, reviewed relevant documents concerning the site and the pertinent medical literature and prepared a report. Copies of that report and most of the supporting references are enclosed, as is a copy of his resume. These comments relate to Area 1 as well as to Area 2 and are relevant to the risk assessment being prepared. The Companies do intend to review that risk assessment when it has been completed and to provide comments on it.

By copy of this letter, copies of this report are being provided to, among others, ATSDR and the New York State Department of Environmental Conservation and Department of Health, for their consideration.

Sincerely,

Jeff Civins

Jeff Civins

JC:ab
Enclosures

cc: Ms. Magalie Beausejour, EPA Region II
Mr. William Nelson, ATSDR, New York
Mr. Edward O. Sullivan, NYSDEC
Mr. Michael O'Toole, Jr., NYSDEC
Mr. Robert Foltin, NYSDEC
Mr. Bill Lowden, NYSDH
Ms. Lisa Ryan, U.S. Department of Justice
Mr. David Hird, U.S. Department of Justice
Mr. Dino Mulardelis, Village of Cold Spring
Mr. James P. Rod, National Audubon Society
Mr. Tom Valentine, CCART
Mr. Michael C. Veysey, Gould Inc.

LETTER FROM VINSON AND ELKINS - AUG. 23, 1988

Copies of the Risk Assessment for the residential yards as well as the draft ATSDR Health Consultation were made available for Vinson and Elkins' review. Attached is the final version of the ATSDR memo and a memo from Peter Grevatt.

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September 9, 1988

Delivery by Federal Express

Ms. Beverly Kolenberg
U. S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

Re: Marathon Battery Site -- Cold Spring
Putnam County, New York

Dear Ms. Kolenberg:

Thank you for arranging our September 1, 1988 meeting among representatives of EPA Region II, the Agency for Toxic Substances Disease Registry ("ATSDR"), the New York State Department of Environmental Conservation ("NYSDEC"), the New York State Department of Health ("NYSDOH"), ERT, and Marathon Battery Company, and Dr. Bert L. Vallee of Harvard, to discuss health effects associated with cadmium. A list of those in attendance is attached. We believe this meeting was a positive step in addressing the health concerns of the residents of Cold Spring.

At the meeting, Dr. Vallee discussed his conclusions, based on the results of his extensive knowledge and review of the pertinent scientific literature, which were presented in his August 19, 1988 letter. Representatives of the ATSDR and NYSDOH disputed certain of the conclusions of Dr. Vallee, but the ensuing dialogue was incomplete. I asked Dr. Vallee to assist me in summarizing his factual presentation, identifying the issues of controversy, and suggesting a mechanism for resolving those issues. He suggested that representatives of the ATSDR and NYSDOH document the scientific basis for their position so that differences in fact, as contrasted with differences in opinion, could be identified. Set forth below is a summary of Dr. Vallee's views, the issues of dispute, and specific requests for documentation, which are directed to ATSDR and NYSDOH by copy of this letter.

At our meeting, Dr. Vallee briefly indicated his past experience and background in metallobiochemistry and his exploration of the biological role of metals, particularly zinc and cadmium. He emphasized that his comments dealt with cadmium in relation to human health. He stated his conclusion that the ingestion of cadmium and its subsequent intestinal absorption, two discrete successive physiological processes, does not constitute a threat to human health, when this metal is obtained through the food chain. Dr. Vallee distinguished between the inhalation and ingestion pathways and noted that zinc, iron and copper when inhaled all result in "metal fume fever," as does cadmium.

He then noted that the human biology, biochemistry, and nutrition of cadmium have been studied very sparingly; much of it is unknown, largely due to the long delay in the analytical identification of this element and its biological complexes. Metallothionein, which Dr. Vallee discovered, is the only known exception in mammals. This protein contains large amounts of cadmium, is ubiquitous, and is now the subject of much study in bioengineering.

The toxicological consequences of exposure to cadmium have been studied intensively. As indicated in his letter, much of the literature deals with industrial exposure to cadmium fumes and their subsequent inhalation, followed by toxicological manifestations and pathology particularly of the kidney. The effects of cadmium also have been examined in animals subsequent to other routes of administration and absorption.

Dr. Vallee has explained that the intestine is clearly the normal channel for absorption of all nutrients. This organ has evolved selective, specific and characteristic features to ensure that essential food constituents of all kinds, including metals such as Fe, Zn, Cu, and Mg, are absorbed in quantities sufficient for biological requirements while protecting the body against toxicity. There usually are quite distinctive means to assist absorption of "normal" constituents of the diet.

The acquisition of metals through the lung and/or skin lacks the features inherent to the gastrointestinal canal, depriving the body of its physiological and biochemical discrimination and accounting for pathology that may occur on absorption through other channels such as the lung; this is a general principle. This principle is readily apparent when inspecting the absorption of many other metabolites and chemicals, e.g., estrogens, anesthetics, tobacco, narcotics, etc., through the lung or skin. While the details of their disposition subsequent to abnormal routes of intake vary, this occurs in a manner specific for each substance -- a subject virtually unexplored for cadmium. References to the general principles concerning distinctions between the ingestion and inhalation pathways are readily available in treatises of physiology, nutrition and medicine.

On the basis of these considerations and unknowns, Dr. Vallee cautioned against simplistic generalizations in the assessment of ingested cadmium effects, based on the toxicological experiences and pathology gathered with cadmium inhalation.

Representatives of ATSDR and NYSDOH asserted that the toxicity, in particular, renal toxicity, of cadmium does not differ in humans subsequent to its ingestion on the one hand and its inhalation on the other. In the interest of furthering our dialogue, please provide us copies of all the studies that support this claim.

Representatives of ATSDR and NYSDOH also stated there was much literature to support the claim that the ingestion of cadmium does pose a threat to human health. We also request that we be provided copies of those studies that the two agencies believe support this claim.

Dr. Vallee noted that Itai-Itai disease was seen and studied in women past menopausal age who suffered from osteomalacia, concomitant renal disease and vitamin D disorders and who also had a high intake of cadmium due to cadmium enrichment of their rice diet. However, Itai-Itai disease was not observed in males as well as women not suffering from osteomalacia or menopausal syndromes, and that the population group chosen for study was selected for females of the above type and therefore biased. The agencies suggested that nephrotoxicity in these patients is independent of osteomalacia and is due to cadmium. Please provide copies of any studies relied upon by the agencies in reaching the conclusion that cadmium causes osteomalacia and, therefore, Itai-Itai.

With an opporunity to review the requested documents, we believe real progress can be made in addressing the health concerns of area residents. Thank you again for arranging the meeting.

Sincerely,

Jeff Civins

Jeff Civins

JC:ab
Attachment

cc: Ms. Magalie Beusejour, EPA Region II
Mr. Doug Tomchuk, EPA Region II
Mr. Joel Singerman, EPA Region II
Ms. Nicki DiFonte, EPA Region II
Mr. Peter Grevatt, EPA Region II
Mr. William Nelson, ATSDR
Mr. David Mellard, ATSDR
Mr. Arthur J. Newell, NYSDEC
Mr. Ron Sloan, NYSDEC
Mr. Scott Rodebaugh, NYSDEC
Mr. Robert Foltin, NYSDEC
Mr. Anthony Grey, NYSDOH
Mr. Steve Bates, NYSDOH
Mr. William Lowden, NYSDOH
Mr. Mark Moese, EBASCO
Mr. Neil J. Wilding, EBASCO
Mr. Robert Clemens, ERT, an ENSR Company
Mr. Paul Anderson, ERT, an ENSR Company
Mr. Robert M. Zoch, Jr., ERT, an ENSR Company
Dr. Bert Vallee, Harvard Medical School
Ms. Lisa Ryan, U.S. Department of Justice
Mr. David Hird, U.S. Department of Justice
Mr. Dino Mulardelis, Village of Cold Spring
Mr. James P. Rod, National Audubon Society
Mr. Tom Valentine, CCART
Mr. Michael C. Veysey, Gould Inc.

Attendance Sheet

9/1/88

Beausejour, Magali	USEPA	212-264-1336
Arthur J Newell	NYSDEC, DF+W	518/457-1769
Ron Sloan	NYSDEC, DF+W	518/457-176
Scott Radebaugh	NYSDEC, DHWR	518/457-170
Anthony Grey	NYSDOH	518/458-637
Steve Bates	NYSDOH	518/458-630
William Lowden	NYSDOH	518/458-6306
Doug Tomchuk	USEPA	(212) 264-7508
Joel Singerman	USEPA	(212) 264-1132
Mark Moese	EBASCO	(201) 460-5920
Neil J Wilding	EBASCO	(201) 460-6077
Peter Grevatt	USEPA	(212) 264-6323
Beverly Kolenberg	EPA	(212) 264-4471
David Mellard	ATSDR	404-488-4100
Bill Nelson	ATSDR	(212) 264-7662
Bob Foltin	NYSDEC	518/457-1708
Nikki DiFrate	EPA/SCB	(212) 264-0970
Rob Clemens	ERT	508 368-8910
[illegible] L. Valle	Harvard University	(617) 732-1867
Michael L. Cioffi	Penn Central Corp.	(513) 891-7090
Jeff Givins	Vinson+Elkins (Houston)	(512) 495-854
Paul Anderson	ERT/ENSR	508-369-8910
Bob Zoch	ERT/ENSR	(713) 520-9494

LETTER FROM VINSON AND ELKINS - SEPT. 9, 1988

Representatives of ATSDR and NYSDOH have not provided EPA copies of studies they used to support the claim that the ingestion of cadmium poses a threat to human health. (see Peter Grevatt's memo)

Received
SEP 30 1988

VINSON & ELKINS
ATTORNEYS AT LAW
FIRST CITY CENTRE
816 CONGRESS AVENUE
AUSTIN, TEXAS 78701-2496
TELEPHONE 512 495-8400

3300 FIRST CITY TOWER
1001 FANNIN
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TELEPHONE 713 651-2222
CABLE VINELKINS-TELEX 762146

THE WILLARD OFFICE BUILDING
1455 PENNSYLVANIA AVE. N.W.
WASHINGTON, D.C. 20004-1007
TELEPHONE 202 639-6500 TELEX 89680

3700 TRAMMELL CROW CENTER
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TELEPHONE 214 220-7700

47 CHARLES ST., BERKELEY SQUARE
LONDON W1X 7PB, ENGLAND
TELEPHONE 01 441 491-7236
CABLE VINELKINS LONDON W-TELEX 24140

September 29, 1988

Delivery by Federal Express

Ms. Magalie Beausejour
U. S. Environmental Protection Agency
Region II
26 Federal Plaza
New York, New York 10278

Re: Marathon Battery Site -- Cold Spring
Putnam County, New York

Dear Ms. Beausejour:

On September 1, 1988, representatives of Marathon Battery Company ("Marathon") met with representatives of EPA Region II, the Agency for Toxic Substances Disease Registry ("ATSDR"), the New York State Department of Environmental Conservation ("NYSDEC"), and the New York State Department of Health ("NYSDOH"). The purpose of the meeting was to discuss health effects associated with cadmium and the relevance of those effects to the referenced site. Among the experts in attendance were Dr. Bert L. Vallee of Harvard Medical School and Dr. Paul Anderson of ERT, who had been retained by Marathon and Gould, Inc. (the "Companies") to review relevant documents concerning the site and the pertinent medical literature. By August 23, 1988 letter, the Companies had submitted an August 19, 1988 report on this subject, prepared by Dr. Vallee. This letter provides further relevant information.

On September 9, 1988, with Dr. Vallee's assistance, the Companies submitted a request to EPA for documentation from the agencies specifically concerning the threat to human health of cadmium ingestion, as distinguished from cadmium inhalation, and concerning the existence of any causal relationship between Itai-Itai disease and cadmium ingestion.

Previously, the Companies had requested that a risk assessment be performed to address risks associated with the presence of cadmium in the soil in vegetable gardens adjacent to the site.

A draft risk assessment, in substantially final form, was prepared on September 8, 1988 by ATSDR and a copy provided the Companies on September 14. By September 28, 1988 letter, a copy of a September 19, 1988 memorandum, prepared by an EPA Region II risk assessor, also was provided. The Companies gave copies of both these documents to Dr. Vallee and Dr. Anderson for comment. Because of the understanding of the Companies that EPA Region II intended to make decisions immediately, based on those documents, this response was hurriedly prepared, based on comments from Dr. Vallee and Dr. Anderson, whose review necessarily was abbreviated. Given the relevance and significance of their comments, the Companies hope the agency will take them into consideration prior to rendering a decision.

Comments on ATSDR Draft Report

The ATSDR draft report references epidemiological studies evaluating health effects associated with the consumption of vegetables grown in gardens containing large concentrations of cadmium in Shipham, England. The draft report explains:

> Residents have been exposed since at least 1940 to soil levels ranging from 2-520 ppm with typical levels being around 90 ppm (Thornton, et. al., 1980). Comprehensive environmental assessments and health studies have been conducted addressing diet and garden vegetable consumption. In a dietary survey of Shipham residents where Cd levels in garden vegetables and vegetable consumption was monitored closely, mean dietary Cd intake was estimated to be 29-35 ug/day (Sherlock, et. al.). In a 40 year follow-up mortality study of Shipham residents, Inskip and Beral (1982) make the following statement, "Thus if cadmium contamination has any effect on the mortality pattern in Shipham it is slight and does not present a serious health hazard to the residents".

ATSDR Draft Report, p. 4. This discussion is entirely consistent with the conclusion discussed by Dr. Vallee in his August 23 report and at the September 1 meeting and summarized in the September 9 letter -- that the ingestion of cadmium in the food chain does not pose health risks.

The draft ATSDR report states that the presence of elevated levels of cadmium in the renal cortex results in proteinuria and glucosuria. ATSDR Draft Report, pp. 1 & 2. Consistent with Dr. Vallee's conclusion, the studies referenced by ATSDR in support of this conclusion relate to health effects associated with inhalation, not ingestion. That there should be a difference between the two pathways is not surprising, given that the intestine, the normal channel for absorption of all nutrients, has evolved selective, specific, and characteristic features to ensure that essential food elements of all kinds, including metals, are absorbed in quantities sufficient for biological requirements while protecting the body against toxicity. The observed health effects relate to situations in which cadmium has been inhaled in relatively high concentrations. See Dr. Vallee's August 19 Report. The ATSDR report indicated recent air monitoring at the site could not detect elevated cadmium levels in the air and presumably the inhalation pathway is not a significant concern. ATSDR Draft Report, p. 4.

The ATSDR report also discusses the relationship between cadmium ingestion and Itai-Itai disease and suggests there is a "causal association." As Dr. Vallee has noted, there is no evidence to suggest that cadmium ingestion bears any relationship to the manifestations of this disease. As discussed in Dr. Vallee's August 19 report, a recently published, six-year study of monkeys fed rice containing cadmium at the same level as that purported to have been eaten by Itai-Itai patients indicated that none of the animals developed any pathology attributable to cadmium. That study, by Nomiyama and Nomiyama (1988), discusses other data which suggest "that daily intake of cadmium was even larger in cadmium-polluted areas without any renal effects than that in cadmium-polluted areas with renal effects," supporting the conclusion that cadmium ingestion does not cause Itai-Itai disease. One of the Shipham studies referenced by ATSDR, published by Inskip and Beral in 1982, stated that no case of Itai-Itai disease was reported in Shipham though soil-cadmium levels were ten times greater than those in that area of Japan where the disease was observed. The causal association referred to by ATSDR is without any factual support in the current literature. Regardless, the factors cited as contributing to the susceptibility of that subpopulation for the most part are not present at the site.

The ATSDR draft report, in discussing the Shipham studies, notes that Inskip and Beral "found a weak association with cadmium exposure and hypertensive and cerebrovascular disease." ATSDR Draft Report, p. 4. As Dr. Vallee noted in his August 19 report, this assertion, which is based on the work of Schroeder, was never confirmed and long since has been disproved.1/ Influenced by Schroeder, the finding of Inskip and Beral is based on a slightly increased incidence of "hypertensive disease" in Shipham compared to Hutton. However, when the authors compared the incidence of "hypertensive disease" between high and low cadmium areas in Shipham itself, they found a lower incidence of "hypertensive disease" in the high cadmium areas. This result, according to the authors, "weaken[s] any argument that the excess of these conditions is due to the raised cadmium levels in Shipham." As the ATSDR report notes, the authors conclude ". . . if cadmium contamination had any effect on the mortality pattern in Shipham it is slight and does not present a serious health hazard to residents."

In sum, there does not appear to be any relevant, current research that indicates that cadmium ingestion poses human health risks. Moreover, even if this fact is ignored, Dr. Anderson's review indicates there does not appear to be any factual support for the recommendation that residential gardens where the soil cadmium levels are around 20 ppm be remediated.

The ATSDR draft report concludes, on page 4, that ". . . it is unlikely that a residential vegetable garden in this neighborhood can supply the large amounts of vegetables over an extended period of time to lead to an intake level that

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1/ With regard to the Schroeder hypothesis, a standard text on internal medicine, Harrison's, Principles of Internal Medicine (11th ed. 1987), does not even mention cadmium in relation to either a cause of essential hypertension or that of any degenerative disease process.

would cause kidney problems [,]" even assuming, contrary to the pertinent literature, that cadmium ingestion does pose a health risk. The ATSDR draft report, on page 7, totally ignores its own conclusion and the results of the Shipman studies in suggesting that "a potential health risk could exist should residents consume large quantities of garden vegetables and fruits over a long period of time, which are grown in soil containing elevated levels of Cd."

The ATSDR draft report, in developing a presumably acceptable level, assumes that 50% of the vegetables consumed are grown in soil containing 20 ppm cadmium. For a family of four, this amounts to eating 975 pounds of backyard garden vegetables per year. Typical vegetable production of a home garden is significantly less. In a personal communication, the National Gardening Association in Burlington, Vermont, indicated that the median garden size is 300 square feet and that, as a rule of thumb, the median annual production is .9 pounds per square foot, for a total annual production of 270 pounds of vegetables per garden. Thus, the ATSDR draft report overestimates exposures by a factor of four and thus selects a level four times lower than necessary to be protective of human health, even assuming that cadmium ingestion does pose a threat and that all the other assumptions are reasonable. Finally, the 20 ppm number itself is arbitrarily chosen and without any scientific and site-specific basis.

Comments on EPA Memorandum

The EPA memorandum does not question the reasonableness of ATSDR's assumptions, nor does it provide independent support for the 20 ppm level selected. The EPA memorandum incorrectly concludes that for noncarcinogenic substances, biological effects occur in a continuum. In point of fact, for those substances, EPA typically assumes the effects have a threshold and thus the dose response curve more closely resembles a step function. See EPA Superfund Public Health Evaluation Manual.

In the memorandum, the author references the request by the Companies to the agency that ATSDR and NYSDOH present studies demonstrating cadmium toxicity following ingestion in humans. The EPA memorandum states as a well-known fact: "These studies simply are not available." At the September 1 meeting, representatives of ATSDR and NYSDOH stated that

Dr. Vallee's conclusion, concerning the toxicity of cadmium through ingestion, flew in the face of the pertinent literature and asserted that many studies were available that contradicted Dr. Vallee's conclusion. That assertion was the basis for the September 9 request by the Companies that those studies be presented. EPA's statement is precisely the point: there are no accepted studies that indicate that cadmium ingestion is toxic to humans.

The EPA memorandum asserts that it has not yet been decisively demonstrated that cadmium is not toxic at low levels of ingestion. The ATSDR draft report itself recognizes cadmium contamination in Shipham, which contained typical soil levels of 90 ppm of cadmium, "does not present a serious health hazard to the residents." The EPA memorandum ignores the Shipham studies and the study by Nomiyama and Nomiyama, which are especially relevant to the Cold Spring site, in concluding that there is a paucity of scientific evidence on the safety of cadmium ingestion.

The EPA memorandum concludes by recommending that the 20 ppm cadmium level selected by ATSDR be accepted as the safe level and rationalizes this recommendation by stating that "EPA is correct in taking a conservative approach." In the absence of scientific data indicating cadmium ingestion poses a health risk, the Companies believe it not conservative, but irresponsible to suggest to the residents of Cold Spring that existing levels of cadmium in garden soils threaten their health, especially where the relevant studies indicate that no risk to human health exists. Regulatory decisions should be based on available scientific information, not on the absence of data.

The Companies hope that EPA will consider these comments in the preparation of its record of decision on Area II. The remediation level suggested in the ATSDR draft report appears to be without any justification in the medical literature and, in any event, to be based on unrealistic and unsupportable assumptions concerning vegetable production and consumption.

Sincerely,

VINSON & ELKINS

Jeff Civins

Jeff Civins
Counsel for Marathon Battery
Company

JC:ab

cc: Ms. Beverly Kolenberg, EPA Region II
Mr. Doug Tomchuk, EPA Region II
Mr. Joel Singerman, EPA Region II
Ms. Nickie DiForte, EPA Region II
Mr. Peter Grevatt, EPA Region II
Mr. William Nelson, ATSDR
Mr. David Mellard, ATSDR
Mr. Arthur J. Newell, NYSDEC
Mr. Ron Sloan, NYSDEC
Mr. Scott Rodebaugh, NYSDEC
Mr. Robert Foltin, NYSDEC
Mr. Anthony Grey, NYSDOH
Mr. Steve Bates, NYSDOH
Mr. William Lowden, NYSDOH
Mr. Mark Moese, EBASCO
Mr. Neil J. Wilding, EBASCO
Mr. Robert Clemens, ERT, an ENSR Company
Mr. Paul Anderson, ERT, an ENSR Company
Mr. Robert M. Zoch, Jr., ERT, an ENSR Company
Dr. Bert L. Vallee, Harvard Medical School
Ms. Lisa Ryan, U.S. Department of Justice
Mr. David Hird, U.S. Department of Justice
Mr. Dino Mulardelis, Village of Cold Spring
Mr. James P. Rod, National Audubon Society
Mr. Tom Valentine, CCART
Ms. Heather White, Office of Congressman Hamilton Fish
Mr. Michael C. Veysey, Gould Inc.

LETTER FROM VINSON AND ELKINS - SEPT 29, 1988

Copies of the Risk Assessment for the residential yards as well as the draft ATSDR Health Consultation were made available for Vinson and Elkins' review. Attached is the final version of the ATSDR memo and a memo from Peter Grevatt.

APPENDIX C

GENERAL RESPONSE
TO THE ATTACHED LETTERS

COMMENT	RESPONSE
• Detection Limit	The results of the remedial investigation indicate that no cadmium is present in the monitoring wells surrounding the dredge spoils vault. The 0.7 ug/l detection limit used by the laboratory that analyzed the groundwater samples collected from the monitoring wells surrounding the dredge spoils vault is essentially the same as the 0.5 ug/l detection limit recommended by NYSDEC. The MCL for cadmium is 10 mg/1, well above the detection level employed.
• Alternate means of transporting contaminated waste	Alternatives for waste transport will be considered during the design phase of this project.
• Vault removal	After consideration of all available information regarding the vault, it is the Agency's conclusion that removal of the vault is a more appropriate solution for this portion of the site in assuring a higher level of confidence in the long-term effectiveness and permanence of the remedy, than the no-action alternative.
• Additional off-site sampling	The Environmental Protection Agency collected soil samples from residential yards located adjacent to the former battery facility to determine whether off-site migration of heavy metal-contaminated dust from the facility had occurred, and if present, whether it posed an immediate health threat to area residents. While we were able to determine from the data that an immediate health threat does not exist, we recognize that additional soil sampling is necessary to

	provide a more definitive characterization of the extent of heavy metal contamination which has migrated from the site. To satisfy these data needs, NYSDEC collected additional soil samples at various locations in the vicinity of the site in early September 1988. Sampling results will be made available to the public once the data has undergone validation. In addition, as part of the remedial design, comprehensive sampling of the adjacent residential yards will be undertaken.
• Failure to inform residents of sampling Results	In the past, EPA collected soil samples from the residential yards adjacent to the former battery facility to determine whether off-site migration of heavy metal contamination from the site had occurred, and whether it posed an immediate health threat to the residents. These data, which indicate no immediate health threat, were discussed at a June 13, 1988 public meeting. Following the public meeting, the data and an explanation of it were forwarded to the residents whose yards were sampled.
• Epidemiology Study (Cancer Study)	The New York State Department of Health Bureau of Cancer Epidemiology completed a cancer study for the town of Philipstown (Putnam County) in 1986. In summary, the incidence of cancer is what would be expected in a similar community in New York State. (See attached report for further details.)

22 Constitution Drive
Cold Spring, N. Y. 10516
June 16, 1988

Magalie Beausejour, Project Manager
US Environmental Protection Agency
Emergency & Remedial Response Division
26 Federal Plaza
Room 23-102
New York, New York 10278

Dear Ms. Beausejour,

I attended your recent meeting of June 13, 1988 as I have in the past and I am extremely dissatisfied with the EPA's decision to leave the existing vault on site or the construction of any other vault.

When the existing vault was put in my "back yard" where was the concern for human health as all of the neighborhood children were witnesses. We had our garden near this vault for years. Did anyone bother to tell us about the contaminated soil or the levels that were acceptable? Did anyone bother to inform the owners of one "back yard" on Constitution Drive that their soil was above acceptable levels of cadmium."

We were informed that the vault area would be maintained and kept cleaned. To my knowledge the area was mowed only once in the past ten years. The area is overgrown with trees, weeds, etc. Are we to believe that tree roots will never damage the vault and cause leakage of these contaminants?

The cancer rate is extremely high in this small community. Many former employees of this battery factory have been victims. We have all heard about the fish, wild life and plants. Have any human studies been completed? What about the people? What about the children from Constitution Drive and the surrounding area? Do the members of this community know that these contaminants will cause lung, liver, and kidney damage?

The only acceptable solution to me is to clean it up before it's too late. I'm not concerned how or where you put the garbage. Maybe you would like it in your back yard.

Tired of waiting for answers,

Cheryl Allen

Cheryl Allen

cc: Putnam County News & Recorder

16 Paulding Ave.
Cold Spring, New York
10516
June 17, 1988

Magalie Beausejour
Remedial Project Manager
U. S. Environmental Protection Agency
26 Federal Plaza Room 23-102
New York, New York 10278

Dear Magalie,

I am writing concerning the Cold Spring Cadmium Pollution Clean-up Plans that were released at the meeting on Monday, June 13, 1988. As a resident of Cold Spring, I have serious concerns about the **No Action** plan for the Dredge Spoils Vault. It was not conclusively proved that the vault was not leaking from your test. Your detection levels show no leakage but, as pointed out at the meeting, these levels are not as low as the ones used by the State DEC. Also at the meeting, an individual from the Audobon Society stated that tests on living organisms were the best indicators of cadmium pollution. Mr. Singerman stated he felt confident that the vault was not leaking and that there was no need to fix something that wasn't broken. I strongly urge your agency to review this option and remove the vault's contents from the plant area.

Secondly, I have serious concerns about the manner of transporting the wastes from the plant. As a resident of Cold Spring, I can verify that traffic on Main Street is at times now congested. Transporting of the wastes by truck could only further congest an area that is already strained. I would therefore hope that your agency would review other means of transporting the waste material.

I sincerely hope that your agency will consider the options chosen and find resolutions that the residents of Cold Spring can live with safely.

Sincerely,

Julianne Russell

VILLAGE OF COLD SPRING
PUTNAM COUNTY, NEW YORK 10516 ⌶ INCORPORATED APRIL 22, 1846

June 22, 1988

United States Environmental Protection Agency
REgion II, 26 Federal Plaza
New York, New York 10278

Attn: Magalie Beausejour, Project Manager
Western New York Remedial Action Section

Dear Ms. Beausejour:

The consensus of the Public Hearing held on June 13, 1988 at the Cold Spring Firehouse was to remove the vault off the premises at the Marathon Battery Site.

Also, prior to removing any hazardous waste off the site area you should notify the Mayor and Board of Trustees prior to doing so.

Sincerely yours,

Roger M. Chirico
Mayor

Board of Trustees
Village of Cold Spring

RMC/fa

cc: Board of Trustees
Putnam County News
Village Attorney Mularadelis

Roger M. Chirico, *Mayor*
Trustees: William Mazzuca, Thomas D. Monroe, Jr., Anthony Patinella, Albert Santivenere
Mrs. Jerome Allen, *Clerk*, Constantine Mularadelis, *Attorney*

11 Main Street, Cold Spring, N.Y. 10516

June 25, 1988

Magalie Beausejour, Project Manager
U.S. Environmental Agency
Emergency & Remedial Response Division
26 Federal Plaza - Room 29-102
New York, New York 10278

Dear Ms. Beausejour;

The accounts of the meeting of June 15, 1988 here in Cold Spring are very disturbing. It is to be hoped that the proposal to leave the vault containing the contaminants and trust to luck that it doesn't leak in the future is incredibly dangerous. It should be removed immediately for the protection of those of us who live in this neighborhood and in the name of common sense.

As for the proposal to truck out the contaminated material still to be removed from the battery plant and its' surroundings - this is truly unbelievable! Anyone who has driven in the village knows that there is no way the streets in question could possibly withstand the influx of heavy trucks at 20 minute intervals for the lengthy span of time necessary to complete the work of removal.

With the obvious alternatives readily at hand, namely - the railroad and the river - I sincerely hope that the frivolous idea of using trucks for this haulage is discarded once and for all time.

Considering the length of time and enormous expenditure of money already devoted to studying this problem, and the moneys supposedly committed to actually getting the work done, those of us most directly involved should expect to see constructive, sensible and immediate action to rid our community of this dangerous situation.

Yours truly,

Susan H. Crofoot

Susan H. Crofoot
11 Main Street
Cold Spring, N.Y.
10516

cc: Putnam County News & Recorder

14 Constitution Drive
Cold Spring, New York 10516
June 24, 1988

Magalie Beausejour
Project Manager, US EPA
Emergency and Remedial Response Division
26 Federal plaza Rm 23-102
New York New York

Dear Ms. Beausejour,

I have lived at 14 Constitution Drive for 24 years and just recently become informed of the effects of cadmium exposure. My neighbors who also happens to be cousins of mine, have unacceptable levels of 67PPM cadmium found in the soil samples taken there. I have taken alarm to this because I have seen in the past and also right now health problems develop. Things such as cancer, ahigh rate of misscarriges, and also still born births within my family. This has caused extreme suffering and I would like to see remedial measures followed through by action. I demand removal of the vault on the Marathon Company Site.

Dredging and placement of these contaminants in this vault was done without attiquate notification of the risks to nearby residents who are now feeling the ill effects on our health. We have been victims of someone elses catostrophic mistake and more mistakes may continue to happen.

We want the toxic vault removed.

Sincerely,
Susan Giachinta

P.O. Box 249 - Deer Hollow Rd.
Cold Spring, N.Y. 10516
June 24, 1988

Magalie Beausejour
Project Manager, U.S. EPA
26 Federal Plaza, Rm 23-102
New York N.Y.

Dear Ms. Beausejour,

It has become hard for me to believe that the EPA is working for the benefit of the American people to insure our safety when no notification was given to the individuals at risk when unacceptable levels of cadmium contaminants are and have been present in soil samples taken in 1986 near family homes.

I lived and grew up all my life at 12 Constitution Drive. I was shocked to read that there is 67 PPm in the backyard where I have spent my childhood. I see this as an extreme lack of responsibility and failure to communicate the dangers that may be involved here.

I and my family demand action to be taken to ensure the safety of our future here. Our main objective is to have the vault removed. Too much valuable information has been kept from us in the past and there is no telling that the future will abide with your special promise to monitor it for 30 years. You may never tell us when it starts to crack and leak into the enviornment. The government has already polluted the Hudson Valley enough when the Sonotone Corp. failed to meet regulation during its plant operations, back in the late 60's and early 70's. Too many people have been exposed to these toxins and we demand more immediate remedial action.

Sincerly,

James Pilato

P.O. Box 243 - Fishkill Rd.
Cold Spring, N.Y. 10516
June 27 -1988

Magalie Beausejour
Project Manager
U.S. E.P.A. Emergency and Remedial Response Div.
26 Federal Plaza Rm. 23-100
New York N.Y.

Dear Ms. Beausejour,

I have spent my childhood years at 12 Constitution Drive, during which time the Sonotone Plant was posing a threat to the enviornment and public health safety to nearby residents. Information has not been readily available in the past and the people with the highest risks at stake have not been involved because of lack of knowledge. In so many places in your newsletter, you mention that you have not received public comments on actions and remedial measures that have recently been placed before us. This information has been kept from us until the latest possible moment. 67 PPm found in soil samples taken in 1986.

June 15th 1988 the EPA finally comes to Cold Spring to alert us of the dangers at risk. The fire hazards had been unfolded to us only a few months ago. Your informative updates have been critically behind. Maintenence of the vault area is thouroughly disgusting. There has been none at all. The overgrown fence has fallen over in places and trees have taken route on top of the vault area. I do not believe that a site that looks like this can be in tact.

We demand that the vault be removed to ensure the safety of all.

Sincerely,

20 Constitution Drive
Cold Spring, N. Y. 10516
June 26, 1988

Magalie Beausejour, Project Manager
US Environmental Protection Agency
Emergency & Remedial Response Division
26 Federal Plaza
Room 23-102
New York, New York 10278

Dear Ms. Beausejour,

Since the Superfund investigation began at the Marathon Battery site in 1983, the residents of Constitution Drive have been kept in the dark. We have continually asked the DEC and EPA why no human studies were being conducted and their answer always seemed to be there was no risk to humans at this time. Now, after having to ask for the results of the ground soil samples taken in 1986, we find several yards have a higher cadmium reading than that which is acceptable. Why were we not notified? Why do they still feel there is no risk to human life?

We have planted gardens and ingested the food from these gardens. If there is the slightest possible chance of danger to human life and public health safety, shouldn't we have been notified not to ingest these foods in 1986 when the results were learned?

Now that our yards may be contaminated we are going to have to also contend with the problems of the cleanup - twenty trucks a day up and down our small streets causing total disruption to the village and our neighborhood.

We live on Constitution Drive because it is a lovely family neighborhood. The federal government has come in and totally disrupted our lives and I feel it about time we were being kept informed on a personal level rather than at a town meeting where you are totally ignored until the end of the meeting.

Hopefully, Big Brother will begin watching where he should and take care of Constitution Drive and its residents in the correct manner.

Also tired of waiting for answers,

Margaret Ligay

Margaret Ligay

cc: Putnam County News & Recorder

4 Kemble Ave
Cold Spring, NY U.S.
June 28, 1988

Ms. Magalie Beausejour
Project Manager U.S. E.P.A.
26 Federal Plaza
New York NY 10278

Dear Mrs. Beausejour,

I am writing to you in reference to the Marathon Battery Clean-up.

I hope that your office will reconsider the very short sighted plan to do nothing about the result.

Also, your plan to truck this contaminated debris through the streets of the village and along the only 2 available highways - 9D and 9 - is mind boggling! Especially with the railroad and the Hudson River so close.

You wanted us to express our feelings. Well I hope you will give us some more care and attention. It's about time!

Barbara Stone

COLD SPRING AREA
CHAMBER OF COMMERCE, INC.
BOX 71, COLD SPRING, NEW YORK 10516
TELEPHONE: (914)265-[illegible]

Margaret [illegible]

RESPONSE TO THE JUNE 13, 1988, PUBLIC HEARING CONCERNING THE MARATHON BATTERY COMPANY SITE

GROUND WATER TESTING

None of the alternatives are acceptable until the disputes over ground water contamination measurements are resolved. Apparently, the EPA staff preference for GW1 is based on finding little or no heavy metal contamination using the LEAST stringent testing method discussed at the meeting.

SUGGESTION:

BEFORE a remedial alternative is selected, retest the site using the biological testing method suggested by James Rod of the Audubon Society which identified the presence of contaminants in Foundry Cove that other tests missed.

TRANSPORTATION METHOD, AREAS 1 & 2: COMMENT 1

In both cases it has been assumed that trucks would haul the waste off-site. This indeed would be a hazard, as you noted. Kemble Avenue is a very narrow, two-way street, the only feasible exit being heavily-traveled Main Street. Ten-wheeler trucks using these streets at 15/20 minute intervals would be dangerous, impractical and needlessly disruptive to the Village.

SUGGESTION:

Ship the material out at night on the train.

TRANSPORTATION METHOD, AREAS 1 & 2: COMMENT 2

FACT: No off-site disposal area was been selected. EPA staff stated that, if none were found, Buffalo would be used. Have you calculated how many trucks/driver shifts would be needed to truck all that stuff to Buffalo? How much more would those trips (or ones to the Ohio site mentioned) cost? How much longer would the clean-up take for any disposal site of similar distance?

SUGGESTION:

Don't use trucks. Use the train — or even barges.

GROUND WATER AND STORAGE VAULT

The No Action alternative favored by EPA assumes no future heavy metal leakage from the vault, no future development of the aquifer for potable or municipal uses, and sufficient flushing of organics from the aquifer to protect East Foundry Cove. It also assumes that alternative S4 "will remove the primary source of contamination."

It is true that, if no methods were available to guarantee against future contamination, those risks would be inevitable. But the technology is available. Therefore future risk is unacceptable.

SUGGESTION:

A stitch in time saves nine. Decontaminate the vault and clean the water.

Cold Spring Area Chamber of Commerce
Caroline Krebs, President

Caroline W. Krebs

THE PUTNAM COUNTY LEGISLATURE
Two County Center
Carmel, New York 10512
914-225-3641

Joseph G. Hickey CHAIRMAN
Anthony J. Cocozza DEPUTY CHAIRMAN
Anthony J. Cocozza COORDINATOR SOLID WASTE PLANNING
Elaine D. Ansbro CLERK
Clement Van Ross COUNSEL

Barbara A. Murphy DIST. 1
Jim Gordon DIST. 2
Louis D. Tartaro DIST. 3
Michael K. Semo Jr. DIST. 4
Lynn E. Greenwood DIST. 5
Anthony J. Cocozza DIST. 6
Robert J. Bondi DIST. 7
Joseph G. Hickey DIST. 8
James J. Mullaney DIST. 9

July 2nd, 1988

Ms. Magalie Beausejour, Project Manager
U.S. Environmental Protection Agency
Emergency and Remedial Response Division
26 Federal Plaza, Room 23-102
New York, New York 10278

Dear Ms. Beausejour,

In EPA's Proposed Remedial Action Plan for the Marathon Battery Company Site, you conclude that your agency's preferred alternatives "will meet the Superfund objective of protecting human health." It was evident at the public hearing held on June 13 that the Cold Spring community disagrees emphatically with the presumption that the alternative of "no action" on the dredge spoils vault is in our healthiest interest. Moreover, when specific questions regarding health hazards to residents of Constitution Drive were raised, EPA gaveled the meeting to an end.

As a result, many important questions were not answered last month. The following are among the concerns I have after attending the public hearing:

1) Superfund law requires that each selected site remedy must be protective of human health and the environment, cost-effective and comply with statutory requirements. In light of the landfill regulations being promulgated by New York State Department of Environmental Conservation for municipal landfills, I find it incomprehensible that DEC concurs with the No Action alternative for the vault. To protect the environment as well as human health, DEC will require that municipal landfills be double composite lined, i.e., two extremely thick and durable 'plastic' liners as well as a number of layers of clay, sand and leachate collecting piping. If the state will not allow us to dispose of household waste in a clay and asphalt lined pit, why should we believe that such a vault is adequate for toxic waste?

2) Acknowledging that someday the integrity of the vault will be lost...how much more costly will it be to remove the cadmium in ten years? Twenty years? Thirty years? And can you guarantee the funds will be available?

3) You currently plan to excavate soils from around the Marathon building and to dispose of them off-site. Would it not be more cost-effective to do the entire job of off-site removal now? Over the long haul, Superfund dollars will be saved by removing the cadmium spoils in the vault at the same time as these other soils. Why incur the expense of permits and endure costly negotiations for transportation twice?

4) Finally, why has EPA failed to properly inform area residents and emergency services of health hazards in and around the Marathon plant? What immediate action do you intend to take to correct this?

The April (?) EBASCO report contains a letter from William Nelson of the Department of Health and Human Services, Agency for Toxic Substances, referring to soil samplings from residents' properties performed in 1986. He calls for "composite samples of backyards to characterize the extent of contamination." Notation in the EBASCO book also states residents on Constitution Drive should not eat vegetables grown in their backyards. (I cannot give specific page reference as this report was no longer available in any of the three repositories as of June 28, 1988.) Why have no health advisories been issued? And, when does EPA or the NYS Department of Health plan to do a study of the long-term health impacts of cadmium in Cold Spring?

* * * *

Please be assured that this community is not composed of a bunch of Nervous Nellies. We have waited patiently -- perhaps too patiently -- for DEC and then EPA to finish studying the Marathon site. Now that the tests are done, we know that one of our only two reliable sources of water will never again be available for safe municipal use; that the cadmium was flushed not only into the Cove but the Hudson River (which squelched our 1983 permit for a pipe and hydrant into the River for additional fire flows); and that a piece of real estate that once was the economic heart of the community will probably be off the tax rolls for many years to come.

What we are is frustrated and anxious... frustrated by delays and lack of action...and anxious in what we perceive as cavelier PR tactics without true regard for the community.

Please renew our trust and belief in the Federal government's concern for Cold Spring. Safely remove the vault's cadmium spoils to a proper toxic waste disposal site.

Sincerely,

Barbara A. Murphy
Legislator, Dist. 1
Health, Education and Social Services Committee, Chair

cc. Hon. Alfonse M. D'Amato, U.S. Senator
Hon. Daniel Patrick Moynihan, U.S. Senator
Hon. Hamilton Fish, Jr. (21st Cong. Dist.)
Hon. Mary B. Goodhue (37th Senate Dist.)
Hon. George E. Pataki (91st Assem. Dist.)
Putnam County News

C.C.A.R.T.

Concerned Citizens About Removing Toxins
20 Constitution Drive
Cold Spring, NY 10516

July 5, 1988

Magalie Beausejour, Project Manager
U.S. Environmental Protection Agency
Emergency and Remedial Response Division
26 Federal Plaza, Room 23-102
New York, New York 10278

Dear Ms. Beausejour:

We are writing to you to comment concerning the EPA proposed remedial action plan for the Marathon Battery site.

We do not agree with any of the EPA's choices regarding the dredge vault as remedy to the site.

We disagree with alternative V-1, no action, for a number of reasons. It appears the decision is based solely on price and not on the effects of the vault becoming compromised. In the 15 years since the vault was constructed, there has been absolutely no maintenance save for one grass cutting. There is no reason to believe that this will change. Asphalt and clay are not impervious to root and vegetation damage. Damage may already be done to the vault since it has been 21 months since its last inspection. Posting of signs and installing fences are not a guarantee of safety. The signs which were erected in the cove and marsh area are illegible after less than 24 months and fences are no longer a deterrent to vandalism.

The danger to health for the Cold Spring area and surrounding communities such as Beacon, Garrison, and the entire Philipstown area as a whole will not be lessened by no action.

We, the citizens on the attached petitions, demand that the EPA adopt option V-6 as the preferred option for the dredge spoils vault.

NO LONGER WILLING TO WAIT FOR ANSWERS,

C.C.A.R.T.

cc: Alphonse D'Amato
Daniel P. Moynihan
Hamilton Fish
Mary C. Goodhue
George Pataki
Peter C. Alexanderson

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION II

DATE: SEP 27 1988

JECT: Comparison of the Dredge Spoils Vault at the Marathon Battery Company Superfund Site to Current RCRA Standards

FROM: Douglas Tomchuk and Alan Straus
Site Compliance Branch Hazardous Waste Facilities Branch

TO: Magalie Beausejour, Project Manager
New York/Caribbean Remedial Action Branch

Purpose

The purpose of this memo is to compare the design and construction of the dredge spoils vault at the Marathon Battery Company site to current standards under the Resource Conservation and Recovery Act (RCRA).

Background

In 1973, the Marathon Battery Company and Gould, Incorporated dredged cadmium-contaminated sediments from Foundry Cove Marsh pursuant to a judicial order. These sediments which contained an average concentration of 1500 ppm of cadmium were dewatered, mixed with 0.5% powdered limestone, and placed in a below-ground vault in 1974.

Dredge Spoils Vault Construction

The vault (according to design documents for lack of "as built" drawings) was about 10 feet in depth. (See Attachments 1 and 2) A two inch asphalt layer was applied on top of the native soils to the side slopes and the bottom of the pit. The bottom of the pit was between 10 and 15 feet above the water table. On top of the asphalt, Putnam clay, with an affinity to adsorb cadmium, was installed in a one foot layer. The sediments (which were dewatered and then mixed with limestone to decrease the solubility of the cadmium contained in them) were then placed on top of the clay. Pipes (the design documents conflict here; about 2-inch diameter pipes are mentioned in the text, and 4-inch diameter pipes are shown in the drawing) were placed on top of the sediments in gravel channels to vent any gases produced by anaerobic decay of organic materials in the sediments. On top of this, 6 inches of Putnam clay was placed, and then a 2.5-inch layer of asphalt. Finally, the area was graded so that the vault was 3-4 feet below the soil surface, and in turn below the frost line.

The Final Recommendations memorandum (Attachment 1) by Dr. Harry Gregor states, "...the Cd in these spoils has a very low solubility, such that even prolonged shaking with river or well water released but 0.03 to 0.08 ppm of cadmium into the water." He stated in a later memorandum, dated May 16, 1974, that "...the asphalt lining was really not essential, but was an additional safety guard."

Current RCRA Construction Standards

At the time the vault was designed there were no standards for containment of hazardous wastes. To compare the vault construction to current standards, EPA looked at the requirements for a new RCRA Subtitle C facility. As explained below, current standards are more stringent than the vault containment, although it is recognized that no design model existed in 1973. It is extremely important to state from the outset, that at a RCRA facility, the most desirable and environmentally sound closure of a hazardous waste management unit is clean closure. EPA prefers to remove the source of contamination for treatment rather than leave it in place. If clean closure is implemented at a site, then limited post-closure monitoring is necessary to assure that cleanup objectives have been met.

Currently, a RCRA Subtitle C facility requires a double-lined system with a leachate collection/leak detection system. A brief description of a typical facility follows. (See Attachments 3 and 4.)

In general, RCRA requires the installation of a soil liner above the native soil foundation, several feet above the seasonal high water table. This liner is a well-compacted soil with a hydraulic conductivity less than 1 x 10-7 cm/sec. It should be at least 3-feet thick, and installed in 6-inch lifts. Directly above the soil liner is a flexible membrane liner (FML) which should be at least 30 mils in thickness. The FML and the 3-foot compacted soil liner combined are considered a "composite" liner. Above the FML of this secondary liner, is the secondary leachate collection and removal system (LCRS). Any leachate that infiltrates the primary liner above this section should be de minimus in volume. Above the primary liner is the primary LCRS, a porous layer capable of maintaining a leachate head of less than 1-foot. The fill material is then placed in the cell.

Upon filling a cell, a gas venting system, if deemed necessary, is installed above the operational cover material. Next, a layer of compacted soil with a hydraulic conductivity no greater than 1 x 10^{-7} cm/sec is installed in a layer that is a minimum of two feet thick. A flexible membrane cover (FMC) with a minimum thickness of 20 mils is placed directly on top of this. Continuing upward, a surface water drainage layer is located above the FMC. A filter layer separates this porous layer from the cover soil above it. The cover soil should be at least 2-feet thick, support vegetation that will effectively minimize erosion, have a final top slope that will effectively promote drainage, and be of sufficient depth to ensure that the FMC is below the frost line.

Vault Comparison

The vault installed at the Marathon Battery Company site, although innovative for its time, is not equivalent to the current requirements of a RCRA Subtitle C facility.

First of all, the vault is not double-lined. The Putnam clay/asphalt layer is considered a single composite liner, therefore, it does not satisfy the requirement for a double liner. Also, the hydraulic conductivity of the Putnam clay is unknown, as is its method of installation. It is only one foot thick instead of the 3-feet as in a RCRA liner.

The monitoring wells surrounding the vault could be used to detect leaks from the vault. However, in addition to the RCRA requirements for groundwater monitoring, RCRA guidance requires that a leak detection/leachate collection system be located between the primary and secondary liners so as to detect any releases from the cell prior to discharge into groundwater. Monitoring wells may identify such a release, but only after the groundwater is contaminated.

The cap of the vault does not contain a sufficient layer of clay to meet the RCRA guidance, and its hydraulic conductivity is again unknown. There is no layer of permeable material to facilitate surface water removal once it reaches the asphalt layer, although the asphalt was pitched for drainage.

Asphalt Integrity

The integrity of the asphalt liner and cap have been questioned. Although there is no evidence that shows that cadmium is leaching from the vault, the actual integrity of the vault has not been confirmed. If the asphalt liner were cracked then there is a potential for flow into the underlying soils and aquifer.

The asphalt cap may have developed cracks due to settling of the dredge spoils. This may allow for channelized flow into the vault. In addition, the vegetative cover is overgrown (i.e., trees 15-25 feet tall). It is possible that the roots of these trees have permeated the asphalt, destroying the integrity of the cap.

Conclusions

The dredge spoils vault at the Marathon Battery Company site does not meet the requirements for a RCRA Subtitle C hazardous waste landfill. The proposed monitoring system to detect possible leachate discharge from the the vault will only do so after contamination has reached the groundwater. In addition, the most environmentally sound closure decision at a RCRA facility is removal of the hazardous waste from the site to health based levels, i.e., clean closure.

cc: Beverly Kolenburg - ORC
Nickie DiForte - SCB
Joel Singerman - NYCRAB

ATTACHMENT 1

Columbia University in the City of New York | *New York, N.Y. 10027*

SCHOOL OF ENGINEERING & APPLIED SCIENCE
Committee on Environmental Engineering **Terrace Building**

MEMORANDUM

TO: T. GORMAN REILLY, ASSISTANT UNITED STATES ATTORNEY
ASSISTANT CHIEF, CIVIL DIVISION
FROM: HARRY P. GREGOR

SUBJECT: DISPOSAL OF SPOILS DREDGED FROM FOUNDRY COVE

FINAL RECOMMENDATIONS

1. As the result of my earlier memorandum and telephone discussions, I believe that all of those listed below are in agreement as to the methodology for disposing of the dredged spoils from Foundry Cove, and on that basis I formally propose the methodology of this memorandum.

2. Those who have been consulted include:

Jack Harrison, N.Y. State Dept. Env. Conservation, White Plains, N.Y.
Cesare Manifredi, N.Y.S.D.E.S., White Plains, N.Y.
Allen E. Raymond, Bur. Facility Design and Operation, N.Y.S.D.E.S., Albany, N.Y.
Nolan A. Curry, N.Y.S.D.E.S., Industrial Facility, Albany, N.Y.
John A. Ruf, EPA, Region II
John Frisco, EPA, Region II

3. These spoils are extensive, constituting approximately 3,000 to 4,000 cubic yards with an estimated average Cd content of 1500 ppm (and an approximately equivalent amount of nickel) and thus contain about 5 tons of

cadmium metal. However, the Cd in these spoils has a very low solubility, such that even prolonged shaking with river or well water released but 0.03 to 0.08 ppm of cadmium into the water.

4. Reports of the geological survey of the area show that it is extremely stable, essentially a glacial till region of such stability that to quote the test laboratory, "buildings as large as the Empire State Building could be built there." The area is free of ground water as borings down to 30 feet demonstrated.

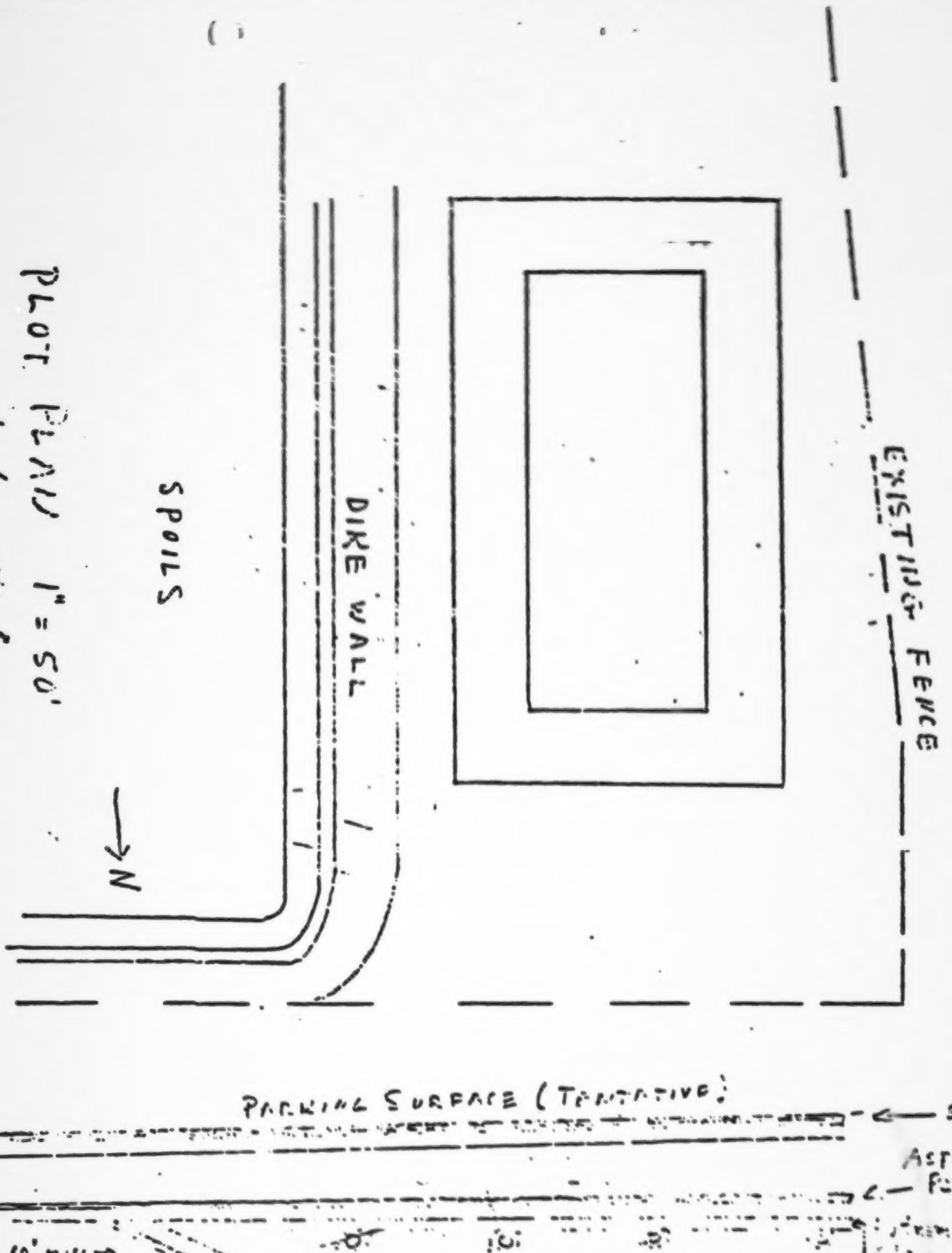
5. Both Marathon Manufacturing and Gould Inc. have expressed to me their agreement with this proposal as regards making available land adjacent to the dike available. We have discussed the exact methodology of this memorandum and they will signify their agreement to you in writing upon receipt of a copy of this document.

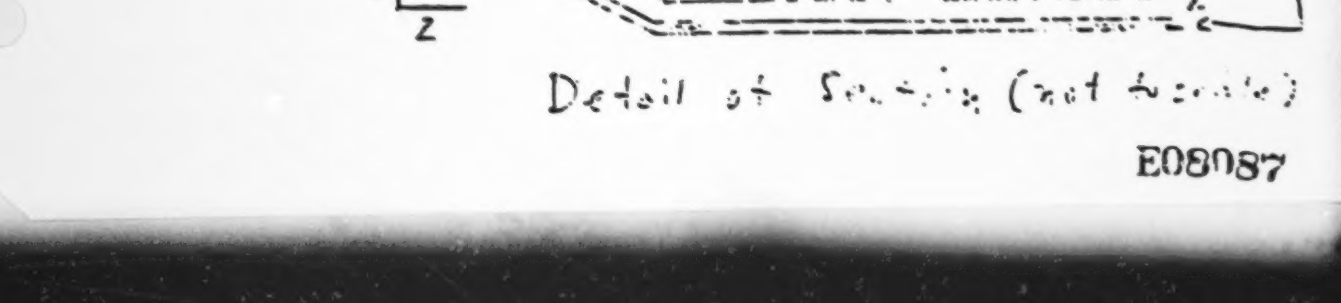
6. I have distributed a set of plans by Gillmore and Olson. These called for the excavation and compacting of the area adjacent to the dike to form a pit about 10 ft. deep with a flat bottom and sloping sides as shown in Fig. 1. The pit would be lined with 2 inches of asphalt paving for sealing and water-proofing. After being

PLOT PLAN 1" = 50'

3/18/74 [illegible]

Fig 1





Detail of Spoils (not to scale)

filled in a manner to be specified, the top of the pit would be sealed with 2.5 inches of asphalt paving on a 6 inch base, etc.

7. That in order to provide for the binding of any traces of Cd leached from the spoils, a layer of Putnam clay which has a high affinity for Cd (Putnam clay is locally available) to a depth of one foot be laid on the bottom and sides of the pit over the asphalt layer. The sides will be arranged or the method of placement will be such that the sides are properly coated.

8. The spoils are now partially dry, about 25% water. When air-dried they have a strong, adobe-brick quality and contain about 10 - 15% water. All of the spoils will be dried insofar as is possible prior to being placed in the pit, and the transfer and filling will be done so as to keep the spoils dry. The spoils will be transferred to the pit by a dry transfer method, as opposed to a hydraulic transfer.

9. After the spoils have been transferred and appropriately compacted, approximately 2 inch porous tile pipe would be placed on top of the spoils with these pipes

appropriately laid in and covered by crushed gravel to allow gases to be vented. These tile pipes would be connected to a vent above ground so that any gases formed in the deposit would be vented and not generate pressure which could cause deformation of the deposit.

10. Then 6 inches of Putnam clay would be laid over the top of the spoils and vent system and be suitably compacted.

11. Then the 2.5 inch asphalt paving would be placed over the pit on a suitable base. This asphalt cover would be sloped to allow for surface drainage and be about 3 - 4 feet below ground level, below the frost line to prevent frost attack.

12. The total volatile solids content of representative samples of the spoils were determined to ascertain the amount of organic material present, along with a determination of the water content of the spoils. These were carried out by drying at 100°C for 24 - 30 hours to obtain water content. TVS was then determined by heating at 600°C for 30 minutes. Composite samples taken from the dike showed a TVS of 11 - 12%, based upon the dry weight. These also showed about 50% water, based on the

original wet weight. Some individual spoils samples were also analyzed. Those taken from the channel banks among the vegetation had as much as 57% TVS; those from the body of the cove were about 10% TVS, as expected.

13. In order to keep the spoils alkaline and avoid an acid environment which could result in metal release, 0.5% (by volume) of powdered limestone will be added to the spoils, appropriately and uniformly mixed with the spoils.

14. I cannot at this time specify the exact source of the Putnam clay to be used. Preliminary tests have shown that the green variety has a higher base exchange capacity than the yellow. A source of high grade clay will be located and used for this purpose.

15. Some preliminary compaction studies would also be made to determine the load bearing characteristics of the spoils. When air-dried they are very hard and rigid, about the consistency of adobe mud bricks. Present plans are to level the area to grade, plant grass seed and enclose it with a fence.

16. If further soil stability tests are favorable, a parking lot could be constructed at grade level above the deposit, with an appropriate slope so as to drain

off rain water readily. Or, if the load bearing characteristics of the spoils material are found to be adequate, the company may wish to place a slab above the deposit pit and put up an appropriate building. The absolute requirement will be that the spoils remain undisturbed permanently, and that the area be enclosed by a fence which would also enclose the vent to protect it against damage.

17. As to how to insure that the deposit will not be disturbed for the indefinite future, and since the nature of restrictive covenants on this land are legal matters, I make no specific recommendation other than that it be assured that the spoils remain permanently sealed.

18. Steps will be taken to obtain permits for this construction from the Village of Cold Spring, with subsequent approval from the Township of Philipsburg if necessary. The New York State Department of Environmental Conservation does not have a permit system as such that would apply; rather, they would issue an approval of this area as being designated as a new disposal site. No permit or formal approval by EPA as such is required.

19. I ask, accordingly, that if this plan meets with your approval, that your office take appropriate actions to inform Marathon and Gould that the provisions of the court order have been met and that work can proceed. A contractor has informed me that the entire project could be completed within a month given the availability of all necessary permits and good weather. As soon as the spoils have been disposed of, the dike will be taken down and the area returned to substantially its original state. I will also ask that the debris from the area be removed so the natural beauty of the Cove is enhanced.

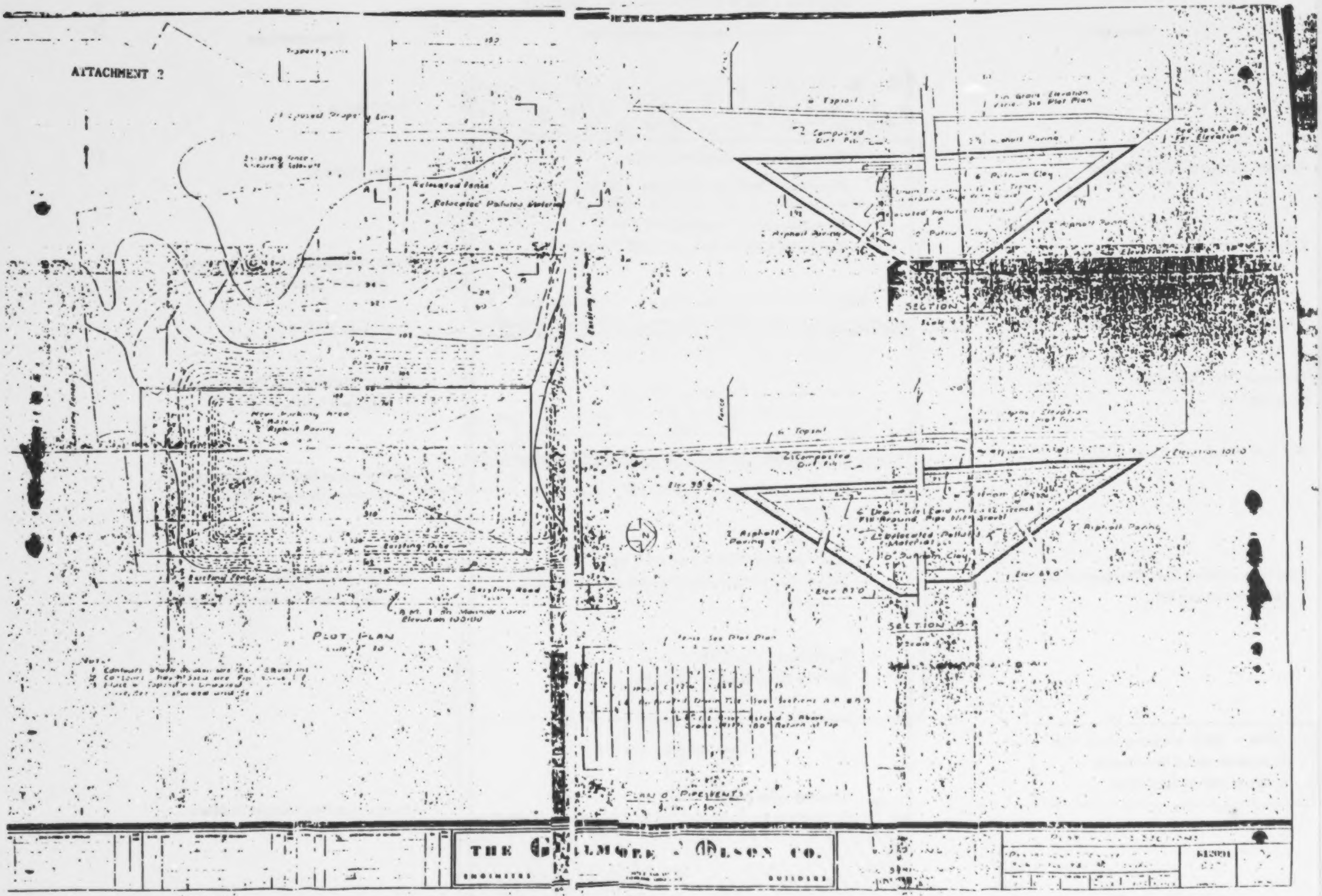
Harry P. Gregor

Harry P. Gregor

Harry P. Gregor
3/30/74

cc: J. Harrison
C. Manifredi
A. E. Raymond
N. A. Curry
J. A. Ruf
J. Frisco
J. Jackson, Gould
D. Mogn, Marathon

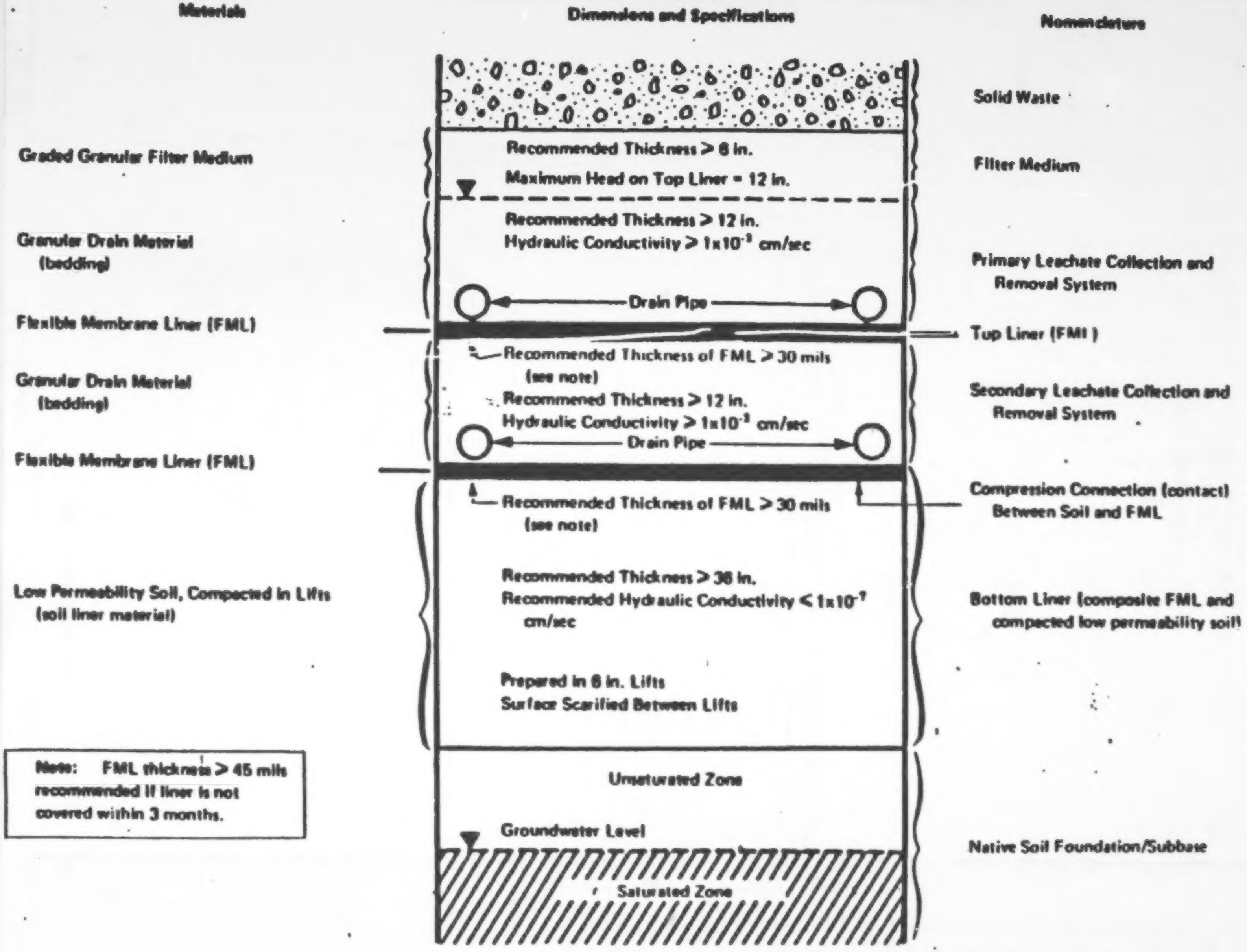
ATTACHMENT 2



ATTACHMENT 3

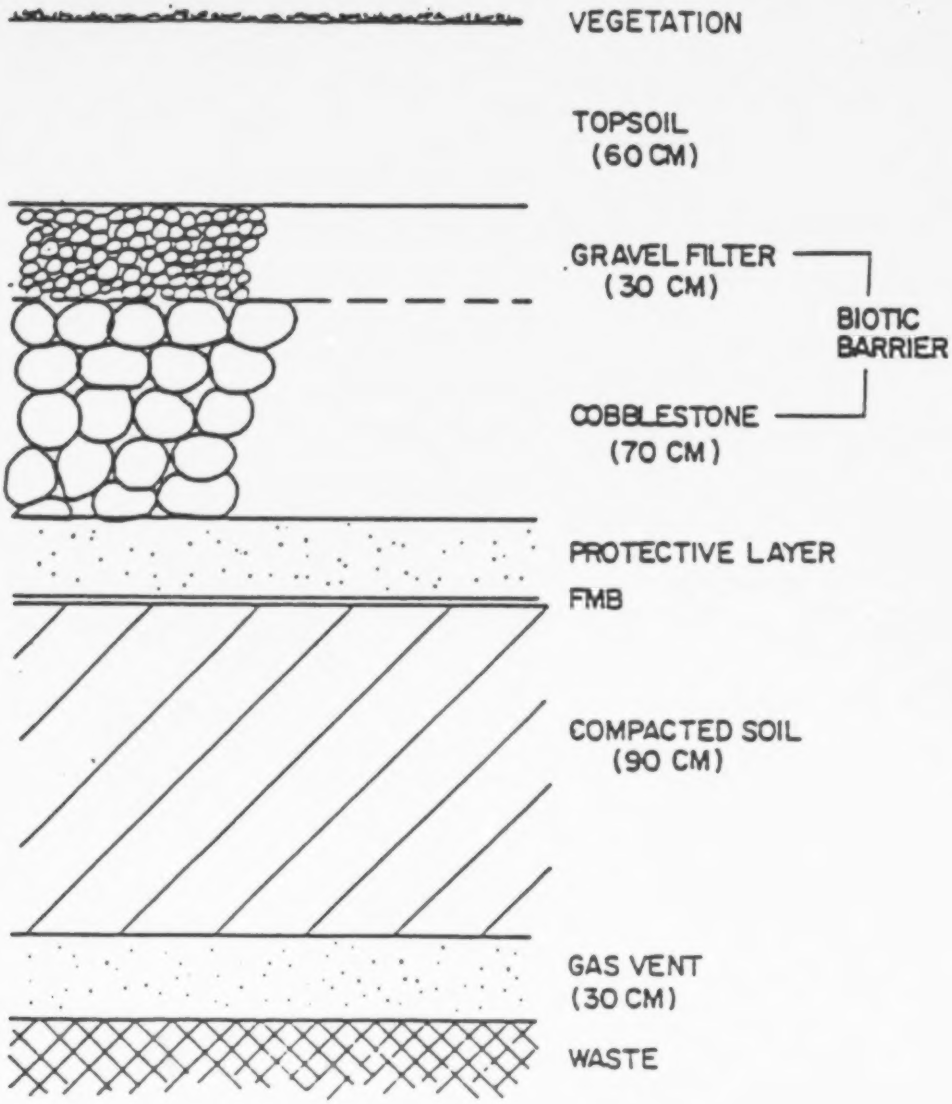
FIGURE 3

SCHEMATIC PROFILE OF AN FML/COMPOSITE
DOUBLE LINER SYSTEM FOR A LANDFILL


Materials
Dimensions and Specifications
Nomenclature
Solid Waste
Graded Granular Filter Medium
Recommended Thickness > 6 in.
Maximum Head on Top Liner = 12 in.
Filter Medium
Granular Drain Material (bedding)
Recommended Thickness > 12 in.
Hydraulic Conductivity > 1x10^{-3} cm/sec
Primary Leachate Collection and Removal System
Drain Pipe
Flexible Membrane Liner (FML)
Top Liner (FML)
Recommended Thickness of FML > 30 mils (see note)
Granular Drain Material (bedding)
Recommened Thickness > 12 in.
Hydraulic Conductivity > 1x10^{-3} cm/sec
Secondary Leachate Collection and Removal System
Drain Pipe
Flexible Membrane Liner (FML)
Compression Connection (contact) Between Soil and FML
Recommended Thickness of FML > 30 mils (see note)
Low Permeability Soil, Compacted in Lifts (soil liner material)
Recommended Thickness > 36 in.
Recommended Hydraulic Conductivity < 1x10^{-7} cm/sec
Prepared in 6 in. Lifts
Surface Scarified Between Lifts
Bottom Liner (composite FML and compacted low permeability soil)
Unsaturated Zone
Groundwater Level
Native Soil Foundation/Subbase
Saturated Zone

Note: FML thickness > 45 mils recommended if liner is not covered within 3 months.

ATTACHMENT 4



OPTIONAL BIOTIC BARRIER LAYER.

EBASCO SERVICES INCORPORATED EBASCO
160 Chubb Avenue, Lyndhurst, NJ 07071-3586, (201) 460-1900

September 28, 1988
MAR-16-88

Ms. Magalie Beausejour
Remedial Project Manager
U S Environmental Protection Agency
26 Federal Plaza
New York, New York 10278

SUBJECT: **REM III PROGRAM - EPA CONTRACT NO.68-01-7250**
WORK ASSIGNMENT NO. 112-2L37.0
MARATHON BATTERY COMPANY SITE, AREA II
CHEMICAL FIXATION VS. "LIMESTONE TREATMENT"

Dear Ms. Beausejour:

In accordance with the request you made in your September 14, 1988 letter, Ebasco has compared the "permanence" of the vault sediments with the chemically fixated sediments.

The vault sediments resulted from treatment of the East Foundry Cove sediments by mixing the sediments with 0.5% (by volume) limestone. The limestone was used to maintain an alkaline pH in the treated sediments so that the heavy metals would not be easily leached out. If the heavy metals were leached out, the alkaline condition should precipitate the heavy metals by forming metal hydroxides. The effectiveness of this treatment is questionable if the treated sediments (i.e., the vault sediments) are in direct contact with rain water (especially, acid rain).

Metal hydroxides are practically insoluble in water but are soluble in acidic solutions. Therefore, under the condition of direct contact with acid rain, it is believed that the heavy metals in the vault sediments would be eventually leached out.

The chemical fixation proposed to treat the East Foundry Cove sediments is a silicate-based solidification/stabilization process. In this treatment process, sodium silicate, Portland cement and proprietary additives are added to the sediments. These treatment chemicals/materials not only maintain the pH of the treated sediment in an alkaline condition, but also can chemically bond heavy metals to form metal silicates and/or physically encapsulate the heavy metals. Metal silicates is not only insoluble in water but also very resistant to acidic solution (e.g., acid rain).

During the RI/FS for Marathon Battery Company Site - Area I, treatability tests were performed on East Foundry Cove sediments by using this silicate-based solidification/stabilization process. The treated sediments passed the RCRA EP Toxicity test (essentially, an acid leaching procedure).

Based on the above treatment mechanisms, it is our belief that the chemically fixated sediments have a higher degree of permanence than the vault sediments, if both are exposed to the same environment.

If you have any questions, please feel free to contact me at (201) 460-6077 or Harry Yeh at (201) 460-6502.

Very truly yours,

Neil Wilding
Site Manager

cc: D Sachdev
H Yeh
M Moese
File

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Agency for Toxic Substances
and Disease Registry

Memorandum

Date September 27, 1988

From Toxicologist, OHA, ERB
Emergency Response Branch, Office of Health Assessment

Subject Health Consultation: Soil Cadmium Levels in Vegetable Gardens Associated with Adverse Human Health Effects, Marathon Battery Site, Putnam County, New York

To Mr. William Nelson
Ms. Denise Johnson
Public Health Advisor
EPA Region II
New York, New York
Through: Chief, Emergency Response Branch, OHA

BACKGROUND

The site formerly known as Marathon Battery is located in Cold Springs, Putnam County, New York and operated as a manufacturer of nickel-cadmium batteries. Since 1981, the property has been used as a book distribution storage facility. A Health Assessment was released by ATSDR on July 16, 1987. The site is approximately 11 acres with restricted access. Twenty-nine single family homes are within 100 feet of the site perimeter, and cadmium has migrated off-site into residential yards. The Environmental Protection Agency (EPA) has requested that the Agency for Toxic Substances and Disease Registry (ATSDR) evaluate the public health concerns from exposure to cadmium (Cd) in residential gardens. A site visit was performed by Ms. Denise Johnson and Dr. David Mellard on August 25, 1988. In the Health Assessment by ATSDR, and in previous health consultations with Dr. David Mellard, ATSDR has requested that additional residential soil samples be collected to better characterize off-site levels of Cd in residential soil. Because these samples were not performed, this consultation must assume that the limited residential soil data to date characterizes conditions in the residential areas. This assumption may or may not be valid.

DISCUSSION

Residential soil levels of Cd range from non-detectable to 67 ppm with most values below 24 ppm. Cadmium is known to bioaccumulate in plants to various degrees; therefore, concern for potential human health effects has been expressed for consumers of garden vegetables grown in cadmium-contaminated soil. At renal cortex levels between 200-400 ug/g, damage to renal tubules results in proteinuria and glucosuria. An age-adjusted increased excretion in the urine of beta$_2$-microglobulin (B$_2$-MB) can serve as subclinical evidence of renal tubular damage. Small increases in urine B$_2$-MB are not considered a severe health impact, but rather a biochemical sign that continued cadmium exposure could lead to more severe health problems. Typical U.S. concentrations of cadmium in the kidney cortex are between 20-35 ug/g with smokers having almost twice the level of non-smokers. Cadmium toxicity was brought to the forefront in recognizing the causal association between the consumption of cadmium contaminated rice and drinking water and the Japanese disease Itai-Itai. Most individuals affected were women above the age of 40 years who had born several children, although more recent studies have detected biochemical effects in adult males. Dietary Cd intake in these women has been estimated at 300-600 ug/day (Friberg, 1971). The factors believed to have contributed to the susceptibility of this subpopulation are listed below:

1. a diet relatively low in calcium and fat-soluble vitamins, such as vitamin D,

2. the loss of bone minerals during pregnancy and lactation,

3. increased Cd absorption because of iron deficiency and lactation, and

4. trace mineral imbalances.

The World Health Organization (WHO) has estimated that an intake of 200 ug/day of cadmium over a 50-year period could produce subclinical kidney damage in the most sensitive individual and has recommended a maximum acceptable daily intake of 70 ug/day. The EPA has recently reported in the July 1988 Superfund Public Health Evaluation manual, a value of 70 ug Cd/day as an acceptable chronic intake in food. While WHO's 200 ug/g Cd in the kidney cortex has been generally accepted as the threshold level for concern, other investigators have evidence that the critical concentration of Cd in kidney cortex is higher (Roels, 200-250 ug/g, humans; Nomiyama, 380-470 ug/g, monkeys; and Cole, 300-400 ug/g humans)(Ellis, 1981; and Cole, 1983). In contrast, Kjellstrom (Friberg, 1985), in a review of several human and animal studies concludes that 10 percent of people with an average Cd renal cortex concentration of 200 ug/g could develop renal tubular damage with low molecular weight proteinuria.

The question has been raised as to what levels of Cd in residential garden soil would lead to plant residue concentrations that could cause kidney problems. Two plant categories are present in evaluating cadmium sorption. Lettuce, cabbage, spinach, kale, and other such leafy type vegetables are considered high accumulators of Cd. Typical concentrations range from 5-10 ppm (dry weight) in these vegetables, when grown in soil containing 70 ppm cadmium (Davis, 1984). At soil concentrations of 15 ppm, Smilde et. al. (1982), find levels of 3 ppm (dry weight) in carrot and potato leaves, and 9 and 5 ppm (dry weight) in radish and lettuce leaves, respectively. A non-linear relationship is shown to exist between soil Cd levels of 5 to 16 ppm and the green leafy portions of radish, lettuce, carrot, and potato plants with higher soil concentrations of Cd leading to non-proportionally higher foliar Cd levels. Vegetable crops such as tomatoes, onions, leeks, turnips, potatoes, sweet corn, beans, beets, radishes, peas, carrots, and grains are low accumulators of cadmium. A linear relationship has been shown to exist for the root of radishes and carrots for soil levels between 5 and 16 ppm Cd (Smilde et. al., 1982). From 5 to 16 ppm soil Cd, levels typically increased 2 to 4 times in lettuce, radishes, carrots, and wheat. At these same levels, potato tubers did not accumulate increased levels of Cd. Similar results were reported by Davis (1984) for soil levels between 1 and 12 ppm. Davis also found that a ten-fold increase in soil Cd levels will result in approximately a 3 to 4 fold increase in plant residue levels. Therefore, a one-to-one relationship does not exist between soil Cd levels and plant residue levels. Hence, an increase from 1 ppm to 10 ppm soil Cd will not result in a 10 fold increase in plant residue levels (but rather a 2 to 4 fold increase depending on the plant species). Potato tubers show less than a 2 fold increase when soil Cd levels increase from 1 to 10 ppm.

The typical U.S. soil concentration of Cd ranges from 0.01 to 7 ppm with a median value of 0.5 ppm (Parr, et. al., 1983). In a survey of major U.S. growing areas uncontaminated by human activities other than normal agricultural practices, Karen Wolnik of the Food and Drug Administration (FDA) reports mean (and maximum) concentrations of Cd (ug/g wet weight) in the following vegetables: lettuce 0.026 (0.16), potatoes 0.031 (0.182), soybeans 0.059 (1.11), and sweet corn 0.0031 (0.0387). In soil containing 5 and 12 ppm Cd, Davis found 1.2 and 2.1 ppm (dry weight) in lettuce, respectively. Since lettuce is 96 percent water, these values correspond to 0.048 and 0.08 ug/g wet weight. At 20 ppm Cd in soil, a residue level of 0.11 ppm wet weight is expected. In soil containing 5 and 15 ppm Cd, Smilde (1982) found 1.5 and 5 ppm (dry weight) in lettuce, respectively. This corresponds to approximately 0.268 ppm (wet weight) in lettuce at 20 ppm Cd in soil.

In low accumulator plants, residue levels of 0.3 to 0.6 ppm (dry weight) typically are found when soil levels range from 1 to 12 ppm. In soil containing 10 to 20 ppm Cd, residue levels of 0.6 to 1.0 ppm (dry weight) are expected (Davis, 1984). At 20 ppm Cd in garden soil, typical residue level in the low accumulator species would be approximately 0.04-0.1 ppm (wet weight) assuming low accumulator vegetables to range from 90 to 96 percent water (Davis, 1984). Table 1 depicts estimated Cd intake using the above data and FDA's 1981/82 Total Diet Study.

Table 1

	Normal Diet g vegetables consumed per day	estimated ug/g Cd plant residue (wet wt) at 20 ppm Cd soil	ug Cd/day if 50% of vegetables consumed home grown
High Accumulator Vegetables	55*	0.27	7.4
Low Accumulator Vegetables	400*	0.04-0.1	8-20
Potatoes*	159*	0.042*	6.7*
Other Foods*			16.7*
Amount Cd from commercial vegetables when 50% vegetables are home grown			2
			41-53

*(Levels reported by FDA as part of 1981/82 Total Diet Study, Gartrell et. al., 1986)

The estimated dietary Cd intake when garden vegetables (grown on soil containing 20 ppm Cd) constitutes 50 percent of vegetable consumption ranges from 41-53 ug/day. This value is below the EPA and WHO acceptable dietary intake of 70 ug Cd/day and is far below the 200 ug/day intake necessary to lead to subclinical kidney problems in the most sensitive individual after 50 years of continuous exposure. In addition, it is unlikely that a residential vegetable garden in this neighborhood can supply the large amounts of vegetables over an extended period of time to lead to an intake level that would cause kidney problems.

Epidemiological studies have been conducted evaluating health effects associated with consumption of home grown vegetables in Cd containing soils. Large concentrations of Cd have been found in garden soils in the village of Shipham, England. Residents have been exposed since at least

1940 to soil levels ranging from 2-520 ppm with typical levels being around 90 ppm (Thornton, et. al., 1980). Comprehensive environmental assessments and health studies have been conducted addressing diet and garden vegetable consumption. In a dietary survey of Shipham residents where Cd levels in garden vegetables and vegetable consumption was monitored closely, mean dietary Cd intake was estimated to be 29-35 ug/day (Sherlock, et. al.). In a 40 year follow-up mortality study of Shipham residents, Inskip and Beral (1982) make the following statement, "Thus if cadmium contamination has any effect on the mortality pattern in Shipham it is slight and does not present a serious health hazard to the residents".

The area surrounding the Marathon facility is heavily vegetated, thereby reducing the potential for contaminated soil to contribute to atmospheric contamination. The degree to which the historical operation of the Marathon facility has contributed to local air pollution cannot be determined, but recent air monitoring at the site could not detect elevated levels of Cd in the air.

Another potential source of Cd to local residents is through consumption of contaminated shellfish (i.e., crabs) from the Hudson River and Foundry Cove. Local and State health authorities have issued public health advisories suggesting that the public not eat more than one meal a week of crabs taken from the Hudson River.

CONCLUSION

Residential soil levels adjoining the Marathon Battery site range up to 67 ppm Cd. A potential public health threat could exist should residents consume large quantities of garden vegetables and fruits over a long period of time, which are grown in soil containing elevated levels of Cd. To determine the extent of residential soil Cd levels, additional soil analysis is required. Daily Cd intake between 300-600 ug/day for several decades has been shown to cause kidney problems thus resulting in the WHO estimation that an intake of 200 ug/day over a 50-year period may lead to subclinical kidney problems in the most sensitive individuals. Both WHO and EPA have established an acceptable daily intake of 70 ug Cd/day. At soil Cd levels around 20 ppm, consumption of garden vegetables and fruits are unlikely to lead to kidney problems from dietary Cd intake.

RECOMMENDATIONS

1. Remediate areas with potential use as residential gardens where soil Cd levels are around 20 ppm.

2. Additional residential soil analysis should be conducted to determine the extent of Cd in residential soils.

3. Alleviate residential fear of consuming home grown vegetables by analyzing Cd content of vegetables grown in remediated, residential soil at this site.

David N. Mellard
David N. Mellard, Ph.D.
Toxicologist

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REMEDIATION OF RESIDENTIAL YARDS

In September 1986, the USEPA and their Technical Assistance Team collected twenty-two (22) surface soil samples from the yards of residences located on Constitution Avenue and The Boulevard, in the Village of Cold Spring, New York. The analytical results from these surface soil samples indicated that cadmium concentrations ranged from 0 to 67 mg/kg, cobalt from 0 to 34 mg/kg and nickel from 0 to 82 mg/kg. Lead was also detected; its concentrations ranged from 0 to 42 mg/kg.

Because only one or two soil samples were collected from each of the residential yards, the areal extent of contaminated soil requiring remediation cannot be fully delineated. For this reason, two cases were examined for clean-up of metal-contaminated soil in residential yards. In the first case, only those residential yards having soils contaminated with relatively high cadmium concentrations (20 ppm Cd) are considered. In the second case, the soils in all residential yards investigated are considered contaminated, regardless of the measured metal concentrations.

Each of these cases would increase the volume of contaminated soil to be treated and disposed of for Alternatives S-3 and S-4 of the FS report. The effects of these cases on the costs of Alternatives S-3 and S-4 are discussed below.

Case I - Clean-up of Selected Backyards

Based on a cadmium clean-up level of 20 ppm, as suggested by the Agency for Toxic Substances and Disease Registry (ATSDR), surface soils in the backyards of houses located at Nos. 2, 4, 12, 16, 20, 22, and 24 Constitution Avenue would require remediation. The cadmium concentrations in the surface soil samples collected from the backyards of these residences ranged from 22 ppm to 67 ppm.

Assuming that removal of the top six inches of surface soil in these backyards would lower cadmium concentrations in soil to less than 20 ppm, then an additional volume of 600 cubic yards of metal-contaminated soil would require treatment and disposal. Accordingly, the costs of Alternatives S-3 and S-4 require revision to reflect the treatment and disposal of this additional volume of metal-contaminated soil. The revised costs for Alternatives S-3 and S-4 are summarized in Table I.

Case II - Clean-Up of All Residential Yards Investigated

This case assumes that the clean-up in question can be achieved by removing the top six inches of surface soils from the yards of all houses adjacent to the former Marathon Battery plant grounds. Based on this assumption, an additional volume of 1,520 cubic yards of metal-contaminated soil would require treatment and disposal for Alternatives S-3 and S-4. The revised costs for these remedial alternatives are presented in Table II.

TABLE I
CASE I - CLEAN-UP OF SELECTED BACKYARDS

REVISED COST ESTIMATES OF REMEDIAL ALTERNATIVES S-3 AND S-4

Alternative S-3

Building Decontamination/Soil Excavation/Fixation/ Enhanced Volatilization/On-Site Disposal

Cost Item	Original Cost In The FS Report	Additional Cost (1)	Revised Cost
Capital Cost	$3,463,000	$138,000	$3,601,000
O&M Cost	330,000 (1 yr)	38,340 (1 yr)	368,340 (1 yr)
	16,000 (2-30 yr)	0 (2-30 yr)	16,000 (2-30 yr)
Present Worth	4,000,000	177,000	4,177,000

Alternative S-4

Building Decontamination/Soil Excavation/Fixation/ Enhanced Volatilization/Off-Site Disposal

Cost Item	Original Cost In The FS Report	Additional Cost (1)	Revised Cost
Capital Cost	$4,609,000	$321,500	$4,930,500(2)
O&M Cost	316,000 (1 yr)	37,300 (1 yr)	353,300 (1 yr)
Present Worth	4,910,000	356,900	5,266,900

Note: (1) Additional cost of clean-up of contaminated soil from some selected backyards.

(2) The cost is based on disposal of the fixated soil/dust at a commercially operated disposal facility. For disposal at a local sanitary landfill, the capital cost and present worth can be reduced to $4,219,300 and $4,555,700 respectively.

TABLE II
CASE II - CLEAN-UP OF ALL RESIDENTIAL YARDS

REVISED COST ESTIMATES OF REMEDIAL ALTERNATIVES S-3 AND S-4

Alternative S-3

Building Decontamination/Soil Excavation/Fixation/
Enhanced Volatilization/On-Site Disposal

Cost Item	Original Cost In The FS Report	Additional Cost(1)	Revised Cost
Capital Cost	$3,463,000	$399,000	$3,862,000
O&M Cost	330,000 (1 yr)	76,000 (1 yr)	406,000 (1 yr)
	16,000 (2-30 yr)	0 (2-30 yr)	16,000 (2-30 yr)
Present Worth	4,000,000	472,600	4,472,600

Alternative S-4

Building Decontamination/Soil Excavation/Fixation/
Enhanced Volatilization/Off-Site Disposal

Cost Item	Original Cost In The FS Report	Additional Cost(1)	Revised Cost
Capital Cost	$4,609,000	$816,000	$5,425,000(2)
O&M Cost	316,000 (1 yr)	95,300 (1 yr)	411,300 (1 yr)
Present Worth	4,910,000	906,600	5,816,600(2)

Note: (1) Additional cost of clean-up of contaminated soil from all the residential yards investigated.

(2) The cost is based on disposal of the fixated soil/dust at a commercially operated disposal facility. For disposal at a local sanitary landfill, the capital cost and present worth can be reduced to $4,596,400 and $4,988,000 respectively.

JNITED STATES ENVIRONMENTAL OTECTION AGENCY
REGION II

DATE:

UBJECT: Analysis of Risk Assessments for the Marathon Battery Site

FROM: Peter Grevatt, Risk Assessor
Program Support Branch

TO: Beverly Kolenberg, Assistant Regional Counsel
Office of Regional Counsel

ATSDR Health Consultation: Soil Cadmium Levels in Vegetable Gardens Associated With Adverse Human Health Effects.

Mellard makes the following assumptions in his review of soil cadmium levels in vegetable gardens associated with human health effects:

Dietary intake of high and low-cadmium accumulating vegetables is as reported in the F.D.A. 1981/82 total diet study. (Gartrell et. al., 1986).

50% of vegetables consumed are home-grown.

Accumulation of cadmium by vegetable classes is as reported in studies published in the literature (Davis, 1984; Smilde, 1982)

The maximum daily dietary intake of cadmium recommended by EPA (1988) and WHO is 70 ug Cd/day. Mellard estimates (using the above assumptions) that the daily dietary intake of cadmium when garden soils contain 20 ppm cadmium will range from 41-53 ug/d. I see no reason to question this estimation. Thus, as Mellard states, 20 ppm Cd in garden soils is expected to be protective of public health.

Question: Are there soil cleanup levels higher than 20 ppm which would be protective of public health?

EPA bases its determination of protective cleanup levels on a comparison of the actual amount of cadmium ingested with a Reference Dose, the maximum ingested amount per kg body weight which is considered safe. For cadmium, the Reference Dose is 1 ug Cd/kg/d, corresponding to a maximum safe daily dose of 70 ug/d for an average 70 kg adult. Mellard estimates the dietary intake of cadmium from soils containing 20 ppm to be approximately 40-50 ug/d. Thus, there are higher soil cadmium levels which by Mellard's analysis would be likely to produce a daily dose below the Reference Dose. However, it is important to recognize that biological effects rarely occur in the clear-cut manner suggested by the Reference Dose (RFD) concept, with all doses below the Reference Dose considered safe, and all those above the RFD considered unsafe. Rather, biological effects occur in a continuum. As the Reference Dose is approached and exceeded, the likelihood of adverse effect begins to increase. Therefore, it may not be appropriate to seek out the absolute highest soil contamination level which produces a daily cadmium dose just slightly below the Reference Dose in our model.

Question: Are there other means to protect residents from potentially harmful intakes of cadmium?

Presumably, since the primary issue of concern here is cadmium intake via ingestion of cadmium-accumulating vegetables, limiting intake of these vegetables will most likely prevent excessive cadmium ingestion. It is critical to consider however, that cadmium will not break down with time, and is not likely to migrate from soils. The effective enforcement of such dietary restrictions years in the future seems highly unlikely, and thus this course of action may not offer long-term protection of human health.

EBASCO "Risk Analysis for Cadmium in Vegetables Grown in Contaminated Soil"

EBASCO presents a "semi-quantitative" assessment of cadmium intake via ingestion of garden vegetables grown in cadmium-containing soils. The assessment is less-specific than ATSDR's in that average and maximum values for cadmium uptake by vegetables were utilized - we know that cadmium uptake by different vegetable types differs widely. The EBASCO assessment has two additional problems: The "acceptable intake" is outdated, and more importantly, an absorption factor for cadmium following ingestion is inappropriately applied to the acceptable intake value. Although the EBASCO assessment roughly agrees with ATSDR in the recommended cleanup level, I think its problems diminish its usefulness to EPA at this time.

VINSON AND ELKINS/JEFF CIVINS MEMO

Jeff Civins accurately summarizes Bert Valee's presentation during the September 1, 1988 meeting. The human biology, biochemistry, and nutrition of cadmium have been studied very sparingly; much of it is unknown. Valee's personal thinking is that like zinc, cadmium will probably be shown not to have toxic effects at low levels of ingestion; however, this has not yet been decisively demonstrated in the laboratory or by epidemiological studies.

Valee suggests that ATSDR and NYSDOH present studies demonstrating cadmium toxicity following ingestion in humans. As he is well aware, these studies simply are not available. Similarly, exhaustive studies demonstrating the safety of cadmium ingestion are also lacking. In light of the paucity of scientific evidence on the safety of cadmium ingestion, EPA is correct in taking a conservative approach in this matter.

cc: Magalie Beausejour
Nickie DiForte
Doug Tomchuk

Attendance Sheet

9/1/88

Beausejour, Magali	USEPA	212-264-1334
Arthur J Newell	NYSDEC, DF+W	518/457-176
Ron Sloan	NYSDEC, DF+W	518/457-176
Scott Radabaugh	NYSDEC, DHWR	518/ 457-170
Anthony Grey	NYS DOH	518/458-63
Steve Bates	NYSDOH	518 /458-630
William Lowden	NYSDOH	518/458-6306
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Joel Singerman	USEPA	(212) 264-1132
Mark Moese	EBASCO	(201) 460-5920
Neil J Wilding	EBASCO	(201) 460-6077
Peter Grevatt	USEPA	(212) 264-6323
Beverly Kolenberg	EPA	(212)264-4471
David Mellard	ATSDR	404-488-4100
Bill Nelson	ATSDR	(212) 264-7662
BOB FOLTIN	NYSDEC	518/457-1708
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[illegible] L. Vallen	Harvard University	(617) 732-1367
Michael L. Cioffi	Penn Central Corp.	(513) 891-7090
Jeff Givins	Vinson+Elkins (Houston)	(512) 495-85
Paul Condason	ERT/ENSR	508-369-8910
Bob Zoch	ERT/ENSR	(713) 520-9494

September 9, 1988

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Toxicologist, OHA, ERB
Emergency Response Branch, Office of Health Assessment

Health Consultation: Soil Cadmium Levels in Vegetable Gardens Associated with Adverse Human Health Effects, Marathon Battery Site, Putnam County, New York

Mr. William Nelson
Ms. Denise Johnson
Public Health Advisor
EPA Region II
New York, New York
Through: Health Assessment Coordination Activity, OHA
Chief, Emergency Response Branch, OHA

BACKGROUND

The former Marathon Battery facility is located in Cold Springs, Putnam County, New York, and previously operated as a manufacturer of nickel-cadmium batteries. Since 1981, the property has been used as a book distribution storage facility. A Health Assessment was released by ATSDR on July 16, 1987. The site is approximately eleven acres with restricted access. Twenty-nine single family homes are within 100 feet of the site perimeter, and cadmium has migrated off-site into residential yards. The Environmental Protection Agency (EPA) has requested that The Agency for Toxic Substances and Disease Registry (ATSDR) evaluate the public health concerns from exposure to cadmium (Cd) in residential gardens. A site visit was performed by Ms. Denise Johnson and Dr. David Mellard on August 25, 1988. In the Health Assessment by ATSDR and in previous health consultations with Dr. David Mellard, ATSDR has requested that additional residential soil samples be collected to better characterize off-site levels of Cd in residential soil. Because these samples were not performed, this consultation must assume that the limited residential soil data to date characterizes conditions in the residential areas. This assumption may or may not be valid.

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the forefront in recognizing the causal association between the consumption of cadmium contaminated rice and drinking water and the Japanese disease Itai-Itai. Most individuals affected were women above the age of 40 years who had born several children, although more recent studies have detected biochemical effects in adutls males. Dietary Cd intake in these women has been estimated at 300-600 ug/day (Friberg, 1971). The factors believed to have contributed to the susceptibility of this subpopulation are listed below:

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The question has been raised as to what levels in residential garden soil will lead to plant residue concentrations that can cause kidney problems. Two plant categories are present in evaluating cadmium sorption. Lettuce, cabbage, spinach, kale and other such leafy type vegetables are considered high accumulators of Cd. Typical concentrations range from 5-10 ppm (dry weight) in these vegetables when grown in soil containing 70 ppm cadmium (Davis, 1984). At soil concentrations of 15 ppm, Smilde _et_. _al_. (1982), find levels of 3 ppm (dry weight) in carrot and potato leaves and 9 and 5 ppm (dry weight) in radish and lettuce leaves, respectively. A non-linear relationship is shown to exist between soil Cd levels of 5 to 16 ppm and _the green leafy portions_ of radish, lettuce, carrot and potato plants with higher soil concentrations of Cd leading to non-proportionally higher foliar Cd levels. Vegetable crops such as tomatoes, onions, leeks, turnips, potatoes, sweet corn, beans, beets, radishes, peas, carrots, and grains are low accumulators of cadmium. A linear relationship has been shown to exist for the root of radishes and carrots for soil levels between 5 and 16 ppm Cd (Smilde _et_. _al_., 1982). From 5 to 16 ppm soil Cd levels typically increased 2 to 4 times in lettuce, radishes, carrots and wheat. At these same levels, potato tubers did not accumulate increased levels of Cd. Similar results were reported by Davis (1984) for soil levels between 1 and 12 ppm. Davis also found that a ten-fold increase in soil Cd levels will result in approximately a three to four fold increase in plant residue levels. Therefore, a one-to-one relationship does not exist between soil Cd levelsand plant residue levels. Hence, an increase

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from 1 ppm to 10 ppm soil Cd will not result in a 10 fold increase in plant residue levels (but rather a 2 to 4 fold increase depending on the plant species). Potato tubers show less than a 2 fold increase when soil Cd levels increase from 1 to 10 ppm.

The typical U.S. soil concentration of Cd ranges from 0.01 to 7 ppm with a median value of 0.5 ppm (Parr, et. al., 1983). In a survey of major U.S. growing areas uncontaminated by human activities other than normal agricultural practices, Karen Wolnik of the Food and Drug Administration (FDA) reports mean (and maximum) concentrations of Cd (ug/g wet weight) in the following vegetables: lettuce 0.026 (0.16), potatoes 0.031 (0.182), soybeans 0.059 (1.11), and sweet corn 0.0031 (0.0387). In soil containing 5 and 12 ppm Cd, Davis found 1.2 and 2.1 ppm (dry weight) in lettuce, respectively. Since lettuce is 96% water, these values correspond to 0.048 and 0.08 ug/g wet weight. At 20 ppm Cd in soil, a residue level of 0.132 ppm wet weight is expected. In soil containing 5 and 15 ppm Cd, Smilde (1982) found 1.5 and 5 ppm (dry weight) in lettuce, respectively. This corresponds to approximately 0.268 ppm (wet weight) in lettuce at 20 ppm Cd in soil.

In low accumulator plants, residue levels of 0.3 to 0.6 ppm (dry weight) typically are found when soil levels range from 1 to 12 ppm. In soil containing 10 to 20 ppm Cd, residue levels of 0.6 to 1.0 ppm (dry weight) are expected (Davis, 1984). At 20 ppm Cd in garden soil, typical residue level in the low accumulator species would be approximately 0.04-0.1 ppm (wet weight) assuming low accumulator vegetables to range from 90 to 96% water (Davis, 1984). Table 1 depicts estimated Cd intake using the above data and FDA's 1981/82 Total Diet Study.

Table 1

	Normal Diet g vegetables consumed per day	estimated ug/g Cd plant residue (wet wt) at 20 ppm Cd soil	ug Cd/day if 50% of vegetables consumed home grown
High Accumulator Vegetables	55*	0.27	7.4
Low Accumulator Vegetables	400*	0.4-0.1	8-20
Potatoes*	159*	0.042*	0.7*
Other Foods*			16.7*
Amount Cd from commercial vegetables when 50% vegetables are home grown			2
			41-53

*(Levels reported by FDA as part of 1981/82 Total Diet Study, Gartrell et.

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The estimated dietary Cd intake when garden vegetables (grown on soil containing 20 ppm Cd) consitutes 50% of vegetable consumption ranges from 41-53 ug/day. This value is below the EPA and WHO accetable dietary intake of 70 ug Cd/day and is far below the 200 ug/day intake necessary to lead to subclinical kidney problems inthe most sensitive individual after 50 years of continuous exposure. In addition, it is unlikely that a residential vegetable garden in this neighborhood can supply the large amounts of vegetables over an extended period of time to lead to an intake level that would cause kidney problems.

Epidemiological studies have been conducted evaluating health effects associated with consumption of home grown vegetables in Cd containing soils. Large concentrations of Cd have been found in garden soils in the village of Shipham, England. Residents have been exposed since at least 1940 to soil levels ranging from 2-520 ppm with typical levels being around 90 ppm (Thornton, et. al., 1980). Comprehensive environmental assessments and health studies have been conducted addressing diet and garden vegetable consumption. In a dietary survey of Shipham residents where Cd levels in garden vegetables and vegetable consumption was monitored closely, mean dietary Cd intake was estimated to be 29-35 ug/day (Sherlock, et. al.). In a 40 year follow-up mortality study of Shipham residents, Inskip and Beral (1982) make the following statement, "Thus if cadmium contamination has any effect on the mortality pattern in Shipham it is slight and does not present a serious health hazard to the residents". The authors found a weak association with cadmium exposure and hypertensive and cerebrovascular disease. The point to remember is that potential exposure at this village was to typical Cd garden soil levels around 90 ppm with a maximum value of 520 ppm.

The area surrounding the Marathon facility is heavily vegetated, thereby reducing the potential for contaminated soil to contribute to atmospheric contamination. The degree to which the historical operation of the Marathon facility has contributed to local air pollution can not be determined, but recent air monitoring at the site could not detect elevated levels of Cd in the air.

Another potential source of Cd to local residents is through consumption of contaminated shellfish (i.e., crabs) from the Hudson River and Foundry Cove. Local and State health authorities have issued public health advisories suggesting that the public not eat more than one meal a week of crabs taken from the Hudson River.

CONCLUSION

Residential soil levels adjoining the Marathon Battery site range up to o ppm Cd; therefore, a potential public health threat could exist should residents consume large quantities of garden vegetables and fruits over a long period of time, which are grown in soil containing elevated levels of Cd. To determine the extent of residential soil Cd levels, additional soil analysis is required. Daily Cd intake between 300-600 ug/day for several decades has been shown to cause kidney problems thus resulting in the WHO estimation that an intake of 200 ug/day over a 50-year period may lead to subclinical kidney problems in the most sensitive individuals.

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Both WHO and EPA have established an acceptable daily intake of 70 ug Cd/day. At soil Cd levels around 20 ppm, consumption of garden vegetables and fruits are unlikely to lead to kidney problems from dietary Cd intake.

RECOMMENDATIONS

1. Remediate areas with potential use as residential gardens where soil Cd levels are around 20 ppm. Additional residential soil analysis should be conducted to determine if elevated levels of Cd are present in residential areas.
2. Alleviate residential fear of consuming home grown vegetables by analyzing Cd content of vegetables grown in remediated, residential soil at this site.

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Toxicologist

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ATTACHMENTS TO
APPENDIX C

DEPARTMENT OF HEALTH OFFICE OF PUBLIC HEALTH
CORNING TOWER • THE GOVERNOR NELSON A. ROCKEFELLER EMPIRE STATE PLAZA • ALBANY, N.Y. 1223

DAVID AXELROD, M.D.
Commissioner

LINDA A. RANDOLPH, M.D., M.P.H.
Director

WILLIAM F. LEAVY
Executive Deputy Director

March 12, 1986

The Cancer Surveillance Program of the New York State Department of Health has completed the investigation of Census Tracts 106 and 107 in the Town of Philipstown (Putnam County) which you requested. The complete report is enclosed.

In summary, the incidence of cancer for both sexes for 1976 through 1982 was no different than that of other similar areas in New York State, excluding New York City. Based on statistical testing, none of the observed numbers of cases were significantly different from the expected numbers. The small deviations seen between the observed numbers of people with cancer and the expected numbers, based on population rates, were within the range which occurs by chance when comparing a single community with a large population.

We receive many cluster requests from people concerned about the environment and its affect on developing cancer. For a cause and effect link to be established, any exposure of concern must have taken place 10 to 20 years before the cancer is diagnosed. The latency period is very long for malignant tumors. Therefore it is very difficult to establish an association. Given the age and sex composition of your community, the incidence of cancer is what would be expected in a similar community in New York State. It is very unlikely that it is linked to any environmental factor that is unique to the study area in Philipstown.

I hope this report answers your questions about cancer incidence in Census Tracts 106 and 107 in the Town of Philipstown. If you have any further questions, kindly give me a call.

Sincerely,

Holly L. Howe, PhD

Holly L. Howe, Ph.D.
Director
Cancer Surveillance Program

HH/dmp
encs.
cc: Dr. DeMartino
Dr. John Simmons

INCIDENCE OF CANCER IN CENSUS TRACT 106 AND 107
IN PHILIPSTOWN (PUTNAM) NEW YORK

Background

The investigation was conducted in response to a telephone call received by Dr. William Burnett, Director of the New York State Cancer Registry, regarding cancer incidence in Cold Spring, New York. Dr. Burnett quoted incidence rates for Putnam County and mentioned that they were considerably below the New York State average. He referred the requestor to Dr. Susan Standfast, who was then the Director of the Cancer Surveillance Program, in case she desired information for a smaller area.

Dr. Standfast received a letter from the requestor on November 26, 1984. The requestor listed several persons who had cancer and stated her belief that cancer incidence was high in the area of Cold Spring. In correspondence dated December 6, 1984, a cancer surveillance form was sent to the requestor. The purpose of the surveillance form used at that time was to specify the exact geographic area of concern, to identify any potential environmental sources of concern, and to state particular cancer sites of concern.

Since we did not receive any information from the requestor, on March 20, 1985, a follow-up letter was sent to the requestor from the Cancer Surveillance Program. The requestor contacted the Program on March 25, 1985 to state that she was still interested in the investigation. At that time, she mentioned that a battery manufacturing company was reputed to have dumped cadmium into the harbor. On March 28, 1985, a map of the area of concern was received and the investigation was able to proceed.

Methods

The study area was defined as Census Tracts 106 and 107 in the Town of Philipstown, which is in Putnam County. The boundaries of these two census tracts are contiguous with the northern, eastern, and western borders of Philipstown. The southern border is County Highway 11, which is also known as Travis Corners Road or Snake Hill Road. The first step was to identify all cases of cancer diagnosed in Census Tracts 106 and 107 in Philipstown during the study period. The source for these data was the New York State Cancer Registry.

The Registry contains information on all cases of cancer reported by hospitals and physicians to the New York State Department of Health, as mandated by law. The period studied for this investigation was the period 1976 through 1982, the most recent year for which reporting was considered complete for small area analysis when the study began.

Variation in cancer incidence among different geographic areas reflects not only true differences in cancer incidence, but also the practices of diagnosing, treating, and recording cancers in various areas in the State. Completeness and accuracy of the Registry depends upon reporting from hospitals. It is estimated that from upstate New York over 95 percent of all cancer cases are reported.

A listing of cases by street name was obtained from Philipstown and the surrounding areas. The address for each case was examined to determine whether the person lived in Census Tract 106 or 107 at the time of diagnosis. All cases with a street address located within the census tracts were grouped by tumor site, sex, and age group. These are referred to as "observed" cases.

The next step was to determine whether this observed number of cancer cases exceeded the number that would be expected in an area of Census Tracts 106 and 107's population size and age composition, if its cancer incidence rate were the same as the rate for other areas in New York State, excluding New York City (upstate New York).

According to the 1980 U.S. Census, the population in Census Tracts 106 and 107 was 5,839, which included 2,860 males and 2,979 females. Age- and sex-specific incidence rates for 1978 - 1982 in upstate New York were used to estimate the expected number of cases for the most common cancer sites and for all sites combined among the residents of the study area. Thus, the expected number of cancer cases was adjusted for sex and age.

Seventeen of the most common cancer sites were examined among the men. These included, among others, lung, colon, rectum, prostate, lymphoma, leukemia, and bladder. Nineteen of the most common sites were examined among the women. In addition to the aforementioned sites (except prostate), cancers of the breast and female reproductive organs were also included. The sites are grouped in the table to protect the confidentiality of individuals diagnosed with any of the less frequently occurring cancers.

The Poisson model was used to assess the probability that chance alone could explain a given increase or decrease in the observed number of cancer cases relative to the expected number (1). If the probability was 0.025 or less for any cancer site, it was considered to be a statistically significiant excess or deficit.

Results

For all cancer sites combined, the incidence of cancer for both sexes together in the study area was similar to the number expected: 178 cases were observed and 182 were expected. In men, 82 cases were observed and 89 were expected. In women, 96 cases were observed and 83 were expected. Although the total number of observed cases is higher than expected in women, none of the observed numbers of cases were significantly different than the expected numbers. These results and those reported below are summarized in the Table.

The sites of cancer most commonly diagnosed in men were lung, male reproductive (including prostate and testis), and colo-rectal. None of the observed numbers of cases were significantly different than the expected numbers. Specifically, 18 cases of lung cancer were observed while 19 were expected. Fourteen cases of colo-rectal cancer were observed, while 15 were expected. Eight cases of male reproductive cancer were observed, and 15 were expected.

The sites of cancer most commonly diagnosed among women were breast, female reproductive, and colo-rectal. None of the observed numbers were significantly different from the expected numbers of cases. Twenty-seven cases of breast cancer were observed and 22 were expected. Fifteen cases of reproductive cancer were observed, and 12 were expected. Seventeen cases of colo-rectal cancer were observed while 14 were expected.

Discussion

In drawing conclusions from these data, two aspects of the statistical method need to be addressed. First, since there were at least 38 tests of significance, it was anticipated that one or two results might appear statistically significant even though the differences between observed and expected numbers were due entirely to random fluctuations in the data. None of the tests of significance performed for this investigation indicated statistically significant excesses or deficits.

The second aspect is the power of the statistical test, that is, the probability that a true departure from the expected number can be detected by significance testing. The power of a test varies with the number of cases expected. For example, using the statistical test described above, the probability of detecting a doubling in cancer incidence over the expected value will be 90 percent or higher when the expected number is at least 16. In the study area, the power of detecting a doubling was high for overall cancer incidence and cancer incidence by sex. It was also high for detecting a doubling of cases of male lung cancer and female breast cancer.

Furthermore, it is possible that by extending the study area beyond a neighborhood or other small area, the effect of a cancer excess has been diluted. However, a neighborhood study could not be done because census data describing the neighborhood size by age and sex are not available. In addition, the number of cases observed would be too small to be able to detect a reasonable and statistically significant increase in cancer incidence should one actually exist. The question of statistical power, as discussed above, becomes such a serious limitation that the investigation of cancer incidence in small areas can not be expected to yield findings that are meaningful or responsive to community concern.

And finally, the latency period between the time of exposure and the onset of clinically-recognizable disease for most adult cancers is generally between 10 and 20 years. Specific cancers may vary somewhat in the length of the latency period, but generally speaking, recent exposures, that is exposure in the last 10 years, can not be expected to be associated with current cancer incidence. Exposures of any type can only be expected to affect cancer incidence following a reasonably long latency period.

Conclusion

The total incidence and the site-specific incidence in Census Tracts 106 and 107 in Philipstown were similar to the expected incidence based on rates for similar areas in upstate New York. The small deviations seen between the observed number of people with cancer and the number expected based on the population standard rates are within the range which occurs by chance when comparing a single community with a large population.

The requestor mentioned a concern about cadmium. Cadmium has been shown to be carcinogenic in animal studies and in occupational studies of humans. The two organs known to be affected are lung and prostate (2). The mode of transmission reported in the human studies was inhalation of cadmium or cadmium compound dust. In the study area, the observed number of lung cancer cases was not different from the expected number in either men or women. The observed number of prostate cancer was lower than the number expected, but not so low as to reach statistical significance. No evidence for elevated incidence rates in cancer sites related to cadmium exposure was detected in this study.

Cancer is a common disease, sometimes more common than many people believe. One out of every three persons will develop it during their lifetime, and it eventually affects three out of every four families (3). The number of people with cancer is increasing in most communities because more people are living to the ages of greatest cancer occurrence.

Much more research is necessary before the causes of cancer are well understood. Current knowledge, however, suggests that the leading preventable cause is cigarette smoking. It is important to emphasize that current estimates attribute only 5 percent of cancer deaths to the physical environment, in other words geophysical factors and pollution. Thirty percent of cancer mortality can be attributed to smoking, 35 percent to diet, 3 percent to alcohol, 7 percent to sexual and reproductive factors, and 4 percent to occupational exposures (4). It is important to note therefore, that any possible risk associated with the environment would most likely only have a small effect on cancer mortality in an area relative to the effect of tobacco.

It is important to realize that many cancers can be effectively treated if they are diagnosed in their early stages. Screening for cancers of the breast, cervix, rectum, colon, and prostate, for example, helps to identify these diseases before the onset of symptoms and at a time when they are usually the most curable. Everyone should visit their physician regularly for a cancer-related checkup.

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Observed and Expected Numbers of Cancer Cases
1976 - 1982 By Site and Sex
Census Tracts 106 and 107 in Philipstown

New York State Cancer Registry

Site (ICD-9)[a]	Males		Females	
	Observed	Expected[b,c]	Observed	Expected[b,c]
All Sites (140-208)	82[d]	89	96[d]	83
Oral (140-149)	6	3	0	2
Colon and Rectum (153-154)	14	15	17	14
Other Digestive Organs (Stomach, liver, pancreas) (151,155,157)	5	6	8	5
Lung (162)	18	19	8	8
Breast (174)	—	—	27	22
Female Reproductive (uterus, cervix, ovary) (179,180,182,183)	—	—	15	12
Male Reproductive (prostate, testis) (185,186)	8	15	—	—
Urinary Tract (bladder, kidney) (188,189)	9	9	4	4
Leukemia and Lymphoma (200-202,204-208)	6	6	7	5
Other (including, among others, melanoma (172) brain (191), thyroid (193))	16	14	10	12

[a] Classification of site was done using the International Classification of Disease 9th edition.

[b] Expected number derived by applying age-sex-specific rates for New York State, excluding New York City, to the 1980 population of Census Tracts 106 and 107 in Putnam County.

[c] Expected numbers may not add to total due to rounding.

[d] Males include 2 cases with an unknown address; females include 4 cases with unknown addresses.